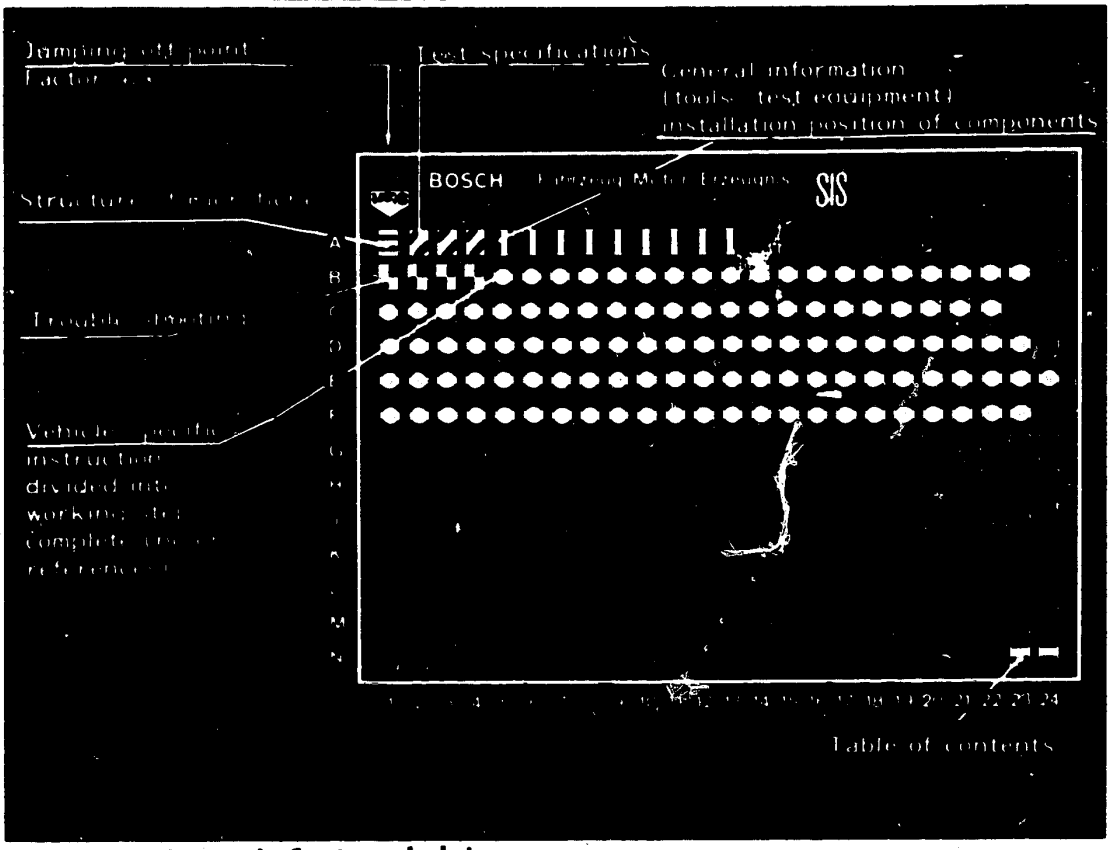
Structure of microfiche



1. Read from left to right
2. Title of microfiche (appears on each coordinate)

E16	Product/component/test step
	Vehicle/engine

Coordinate

3. Limits of section

Beginning — Mid-section — End — One-page section

4. Purely vehicle-specific passages in the text are marked with a vertical bar.

5. Reference to relevant working steps in the test specifications, e.g. coordinate C6.

C6

A1 Trouble-shooting chart

SPECIAL FEATURES

These trouble-shooting instructions are valid for the following vehicle models with diesel engine applicable at the time of publication:

* Peugeot 205 D	(10.83 →)
* Citroen Visa D with 1.71 (XUD7) engine	(01.84 →)
* Peugeot 305 D	(10.82 →)
* Peugeot 309 D	(10.86 →)
* Citroen BX D	(09.83 →)
* Talbot Horizon D with 1.9 l (XUD9) engine	(07.82 →)

1. Test specifications

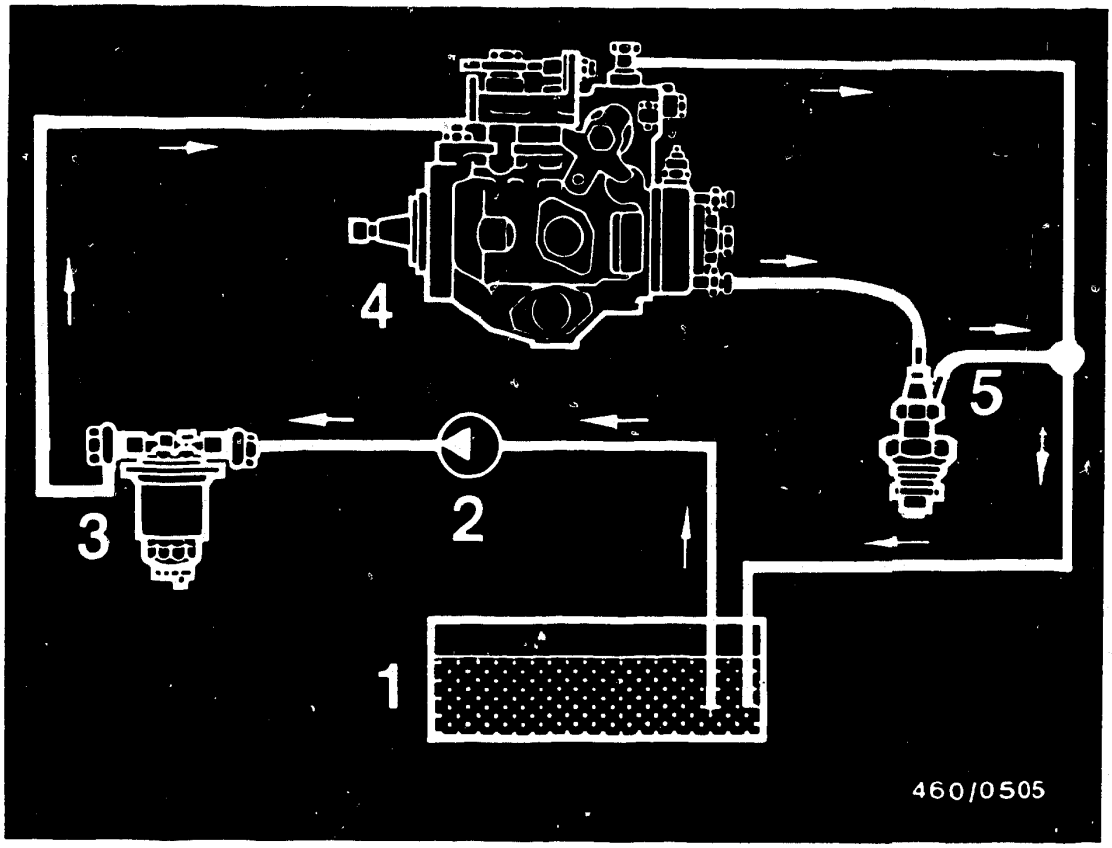
1.1 Idle speed:	800 + 50 min^{-1}	C6
Accelerated idle without LFG with LFG	 1200 ± 50 min^{-1} 950 ± 50 min^{-1}	C14
1.2 Nozzle-opening pressure:	130 + 5 bar	C18
1.3 Filter test max. allowable differential pressure:	 0.3 bar	
1.4 Compression pressure:	25 ... 30 bar min. 18 bar	D17
max. difference between cylinders	 5 bar	
1.5 Compression loss:	max. 25 %	
1.6 Injection timing:	1.9 l (XUD 9)	G1
Setting value Engine position:	 cylinder 4 0,57 mm BTDC	
Checking value Engine position:	 cylinder 4 0,54 ... 0,60 mm BTDC	
Setting value Pump position:	 0.30 mm ABDC	
Checking value Pump position:	 0,29 ... 0,31 mm ABDC	

Injection timing:	1.7 l (XUD 7)
Setting value Engine position:	cylinder 4 0,80 mm BTDC
Checking value Engine position:	cylinder 4 0,77...0,83 mm BTDC
Setting value Pump position:	0.30 mm ABDC
Checking value Pump position:	0,29...0,31 mm ABDC

G1

1.7 Tightening torques

Injection-pump fastening screws	25 Nm
Injection-pump gear (Hexagon nut)	50 Nm
Nozzle-holder assembly fastening screws	90 Nm
Fastening nut of tensioning roller shaft/ adjusting screw	20 Nm
Cylinder-head cover screws	7.5 Nm
Sheathed element glow plugs	25 Nm
Injection-pump support bracket (Fastening screws)	25 Nm
Screw plug	10 Nm
Fuel lines	25 Nm

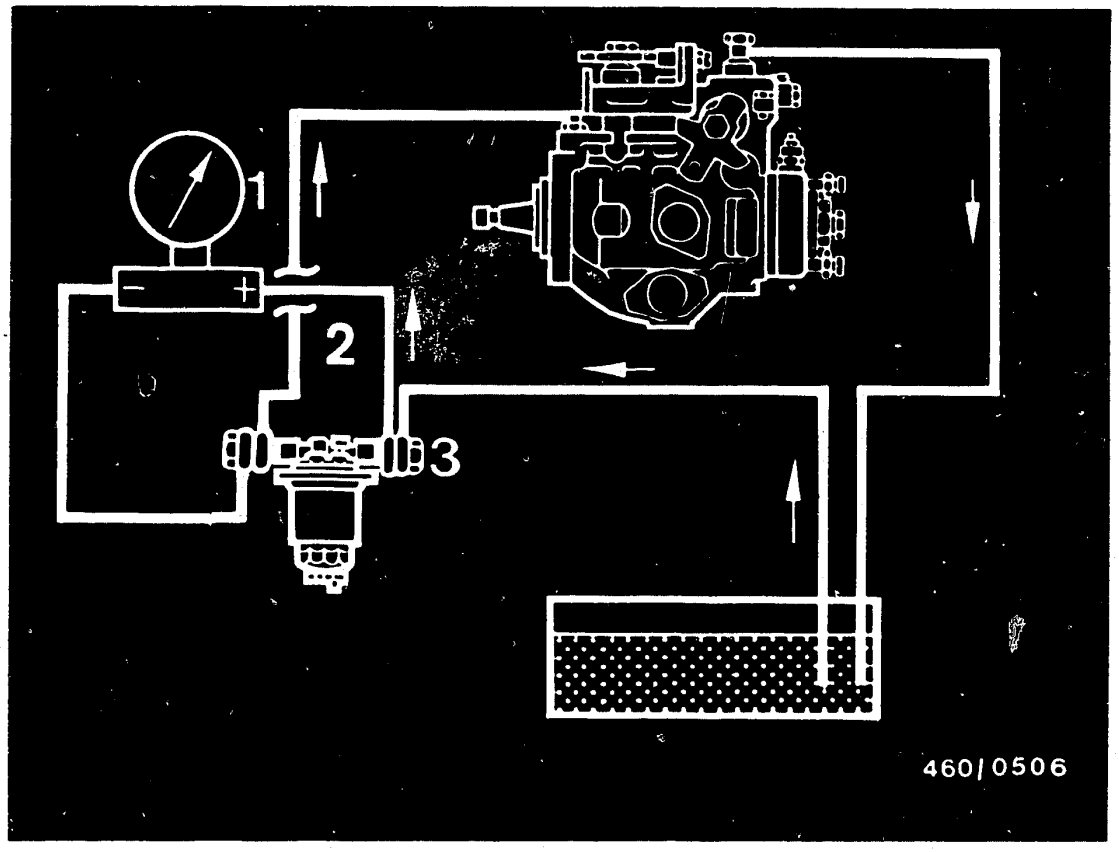


1 = Fuel tank
2 = Fuel pre-supply pump (on export models only)
3 = Fuel filter
4 = Distributor-type injection pump
5 = Injection nozzles

2. Diagram of fuel lines

The fuel lines are connected according to the above diagram.

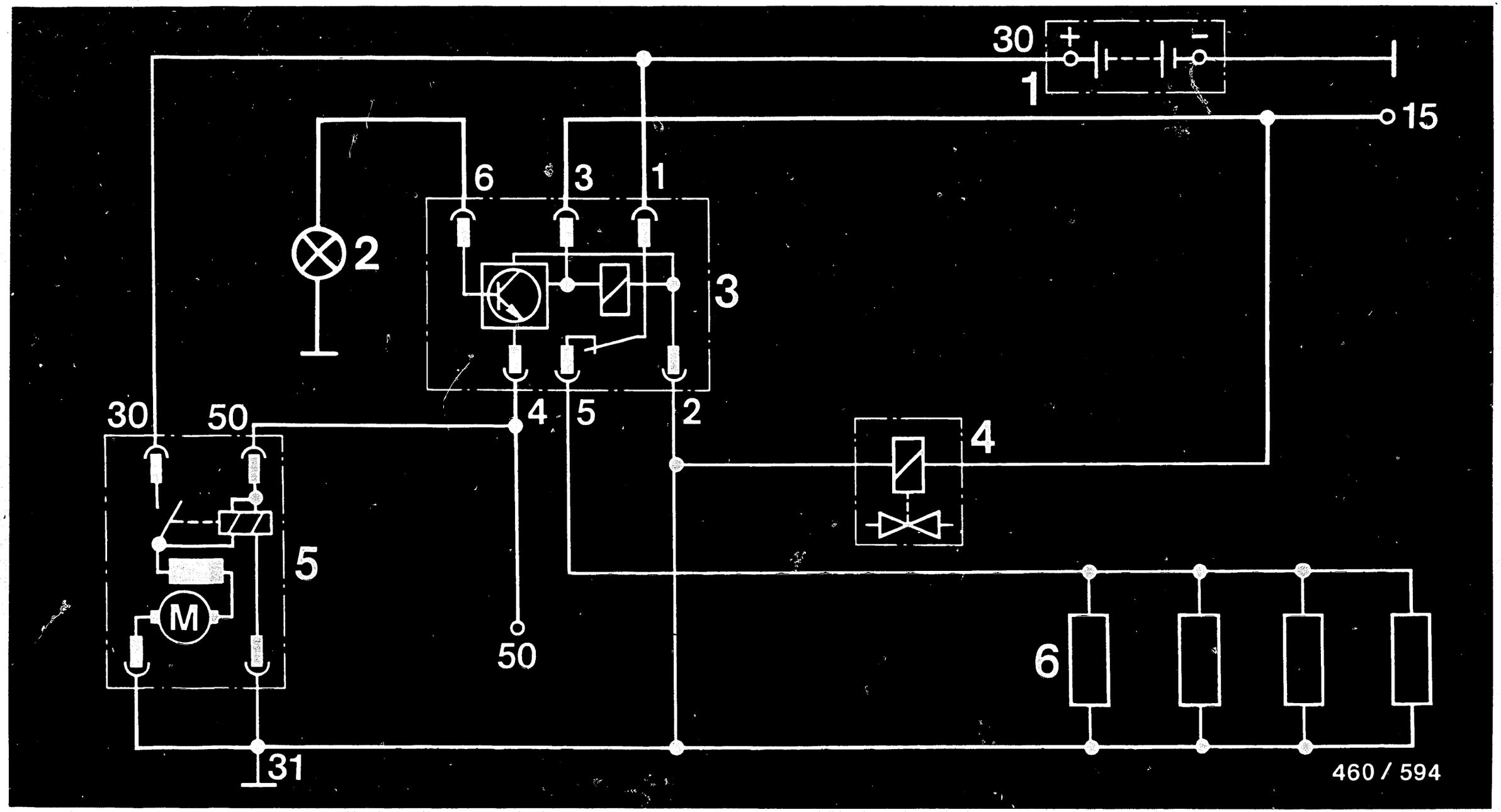
The fuel flows in the direction of the arrows.



1 = Differential-pressure gauge
2 = Filter outlet
(Use inlet union and extra-long inlet-union screw 2 443 456 020)
3 = Filter inlet
(Use inlet union and extra-long inlet-union screw 2 443 456 020)

2.1 Connection diagram for filter test

Connect differential-pressure gauge to fuel filter using appropriate connecting parts.



1 = Battery
2 = Glow-plug indicator lamp (12 V max. 2 W)
3 = Glow-duration unit
4 = Solenoid-operated valve
5 = Starting motor
6 = Sheathed-element glow plugs

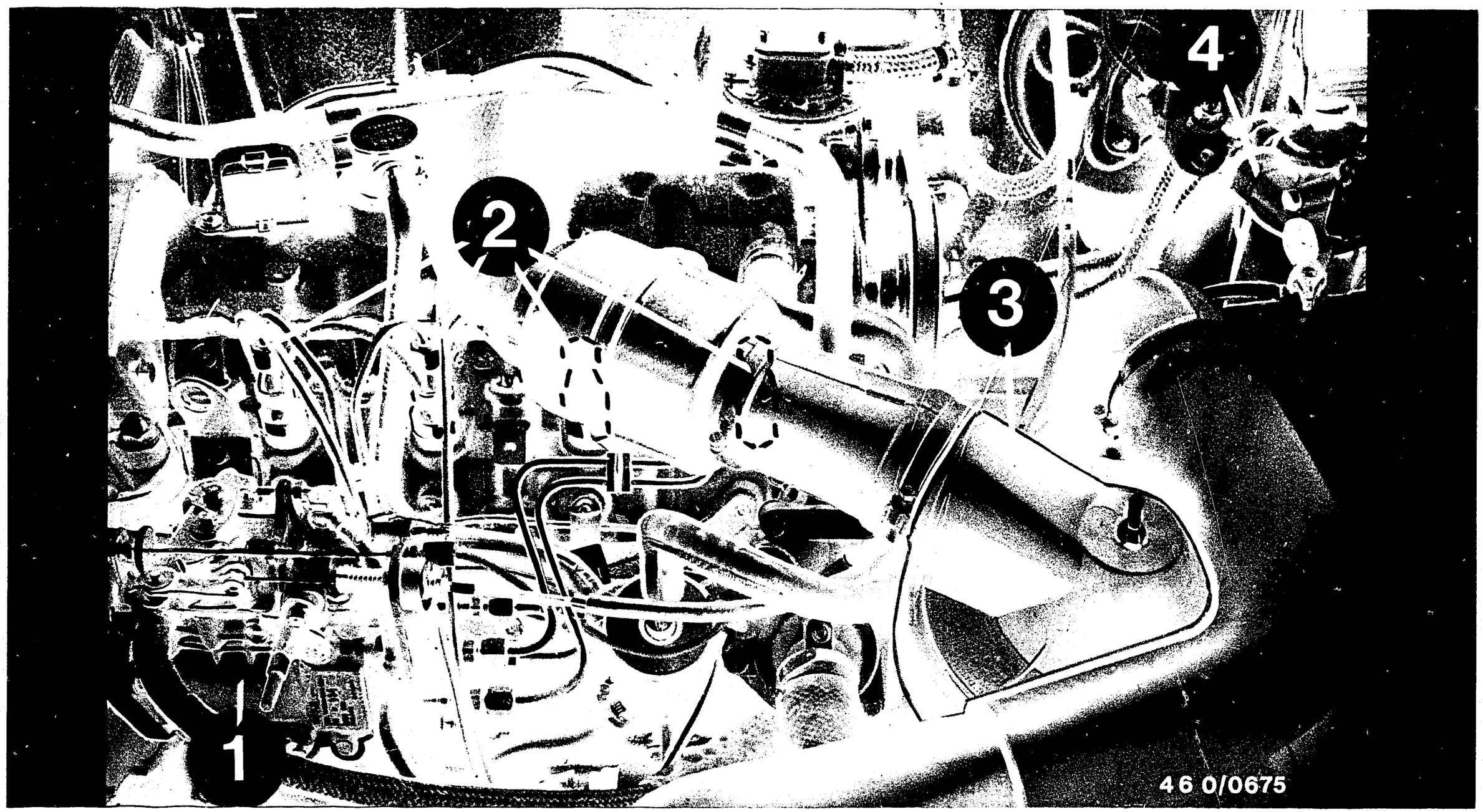
3. Connection diagram for preheating system

4. Test equipment and tools

Designation	Part number	Use
Measuring tool	KDEP 1143	Injection timing
Setting mandrel	KDEP 1145	Locking the flywheel
Tensioning lever	KDEP 1144	Relaxing the toothed belt
Box wrench	KDEP 1115	Loosening/tightening the injection lines
Measuring tool	KDEP 1085	Injection timing
Mini dial indicator 1/100 mm divisions	commercially available e.g. Hahn & Kolb 7000 Stuttgart part no. 33 003 with adapter KDEP 1127	Injection timing

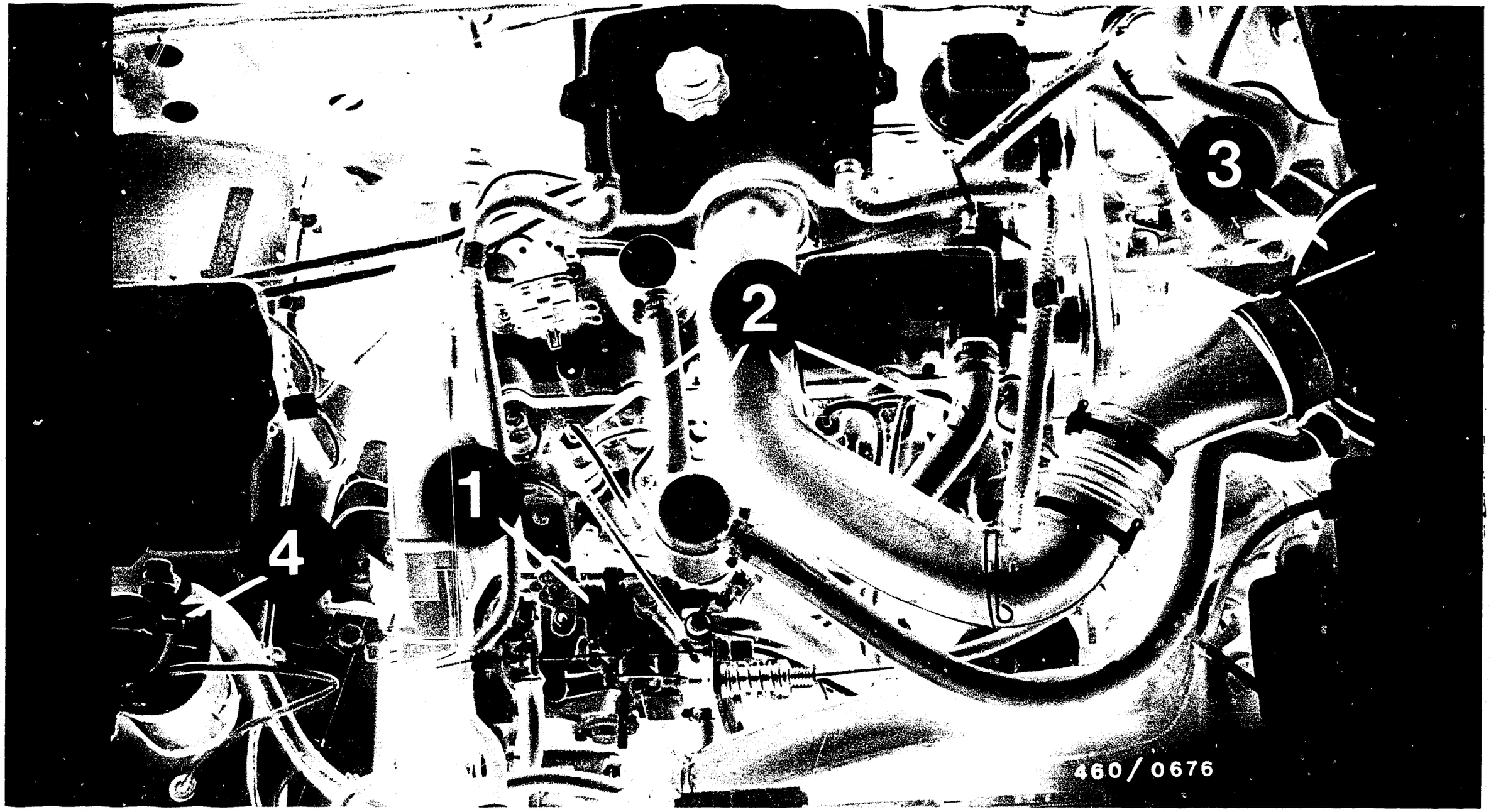
Test equipment and tools (Continued)

Designation	Part number	Use
Nozzle tester	EFEP 60 H 0 681 200 502	Testing the injection nozzles
Compression tester	commercially available	Testing the engine compression
Compression-loss tester	EFAW 210 A 0 681 001 901	Testing the engine compression loss
Tachometer	commercially available e.g. Dr. E. Horn GmbH Meßgerätefabrik Postfach 40 7036 Schönaich order designation: HT 446 (with digital display)	Setting the engine speed
Differential-pressure gauge	commercially available part no. NG 160/ 311-911 -1.0 + 4.0 bar Firma Henni Nauheimer Str. 78-80 7000 Stuttgart 50	Filter test
Smokemeter Accessories box with metering unit	0 684 102 050 0 681 169 038	Smoke test



1 = Injection pump 2 = Injection nozzles 3 = Air filter 4 = Fuel filter

5. Installation position of components in: Peugeot 309 Diesel (10.86 →)
Peugeot 305 Diesel (10.82 →)
Peugeot 205 Diesel (10.83 →)
Citroen BW Diesel (09.83 →)
Citroen Visa Diesel (01.84 →)



1 = Injection pump 2 = Injection nozzles 3 = Air filter 4 = Fuel filter

5.1 Installation position of components in Talbot Horizon Diesel (7.82 →)

6. Trouble-Shooting

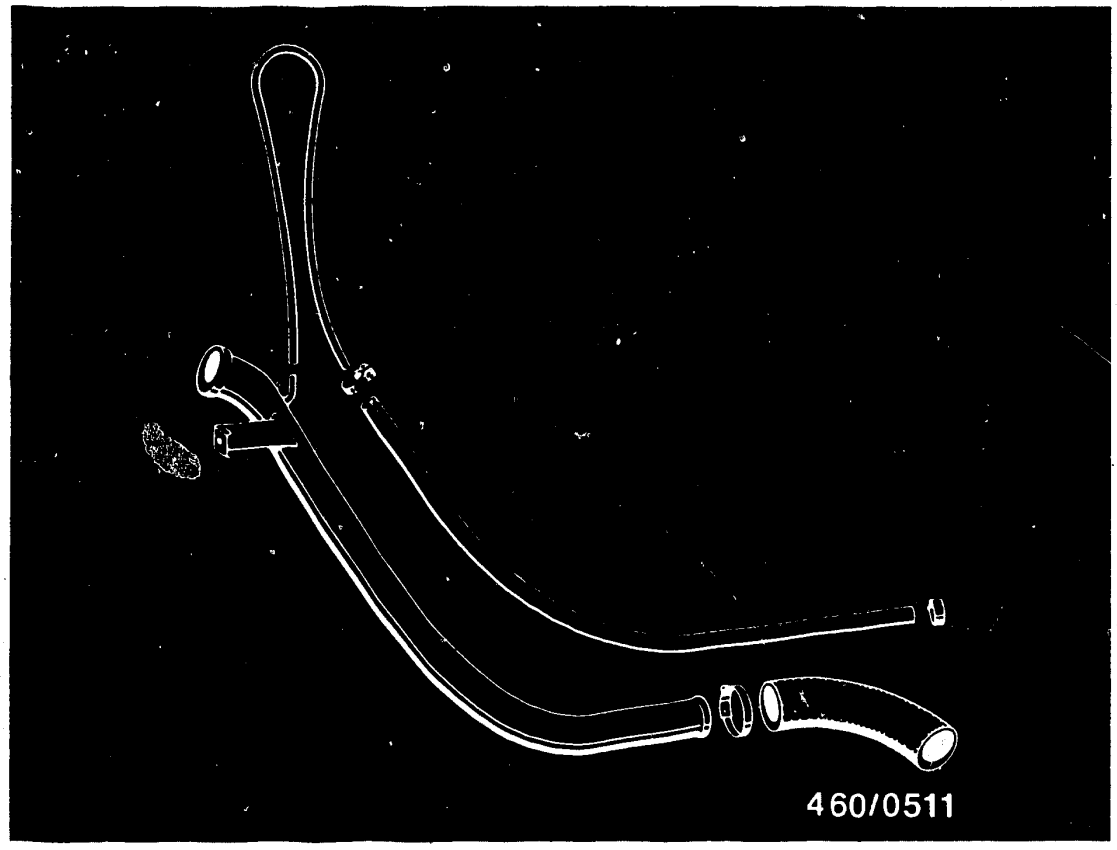
Customer complaint (Fault symptom)

1.	2.	3.	4.	5.	6.	Cause (Component fault)	Coordinates
•	•			•	•	Tank empty; tank vent clogged	B 5
	•		•			Injection sequence does not correspond to firing sequence	B 6
				•		Overflow restriction clogged	B 7
•	•					Shutoff device defective	B 8
		•		•	•	Inlet-union screws of inlet and return lines clogged	B 12
•	•		•	•	•	Air in fuel system	B 13
	•					Heavy paraffin deposits in filter	B 15
•	•			•	•	Connections loose; lines leaking or broken	B 18
•	•			•	•	Supply lines clogged	B 21
•	•			•	•	Injection lines clogged or constricted	B 21
					•	Engine air filter clogged	C 5
			•			Idle speed incorrect	C 6
•	•		•		•	Injection nozzle defective	C 14
	•		•		•	Start of delivery incorrect	G 1
•	•			•	•	Fuel filter clogged	C 18
	•					Preheating system defective	C 21
					•	Timing device defective	D 16
	•		•			Engine compression poor or uneven	D 17
					•	Maximum engine speed incorrectly set	E 4
•	•	•	•	•	•	Injection pump (Governor) defective or out of adjustment	E 4

Trouble-shooting (continued)

Customer complaint (fault symptom)

7. Fuel consumption too high	8. Engine cannot be switched off	9. Engine running rough, black smoke in full-load range; possibly lack of power	10. Fog-like smoke in full-load range (white)	11. Incorrect engine speeds	12. Engine will not rev up when cold	13. Distributor-type fuel-injection pump overheating	Cause (Component fault)	Coordinates
			•		•		Tank empty; tank vent clogged	B 5
		•		•	•		Injection sequence does not correspond to firing sequence	B 6
						•	Overflow restriction clogged	B 7
	•						Shutoff device defective	B 8
			•	•	•		Inlet-union screws of inlet and return lines clogged	B 12
			•		•		Air in fuel system	B 13
					•		Heavy paraffin deposits in filter	B 15
•							Connections loose; lines leaking or broken	B 18
			•		•		Supply lines clogged	B 21
			•		•		Injection lines clogged or constricted	B 21
		•					Engine air filter clogged	C 5
				•			Idle speed incorrect	C 6
		•					Injection nozzle defective	C 14
•		•	•		•		Start of delivery incorrect	G 1
			•		•		Fuel filter clogged	C 18
							Preheating system defective	C 21
		•	•				Timing device defective	D 16
•					•		Engine compression poor or uneven	D 17
				•			Maximum engine speed incorrectly set	E 4
•	•	•	•	•	•	•	Injection pump (Governor) defective or out of adjustment	E 4



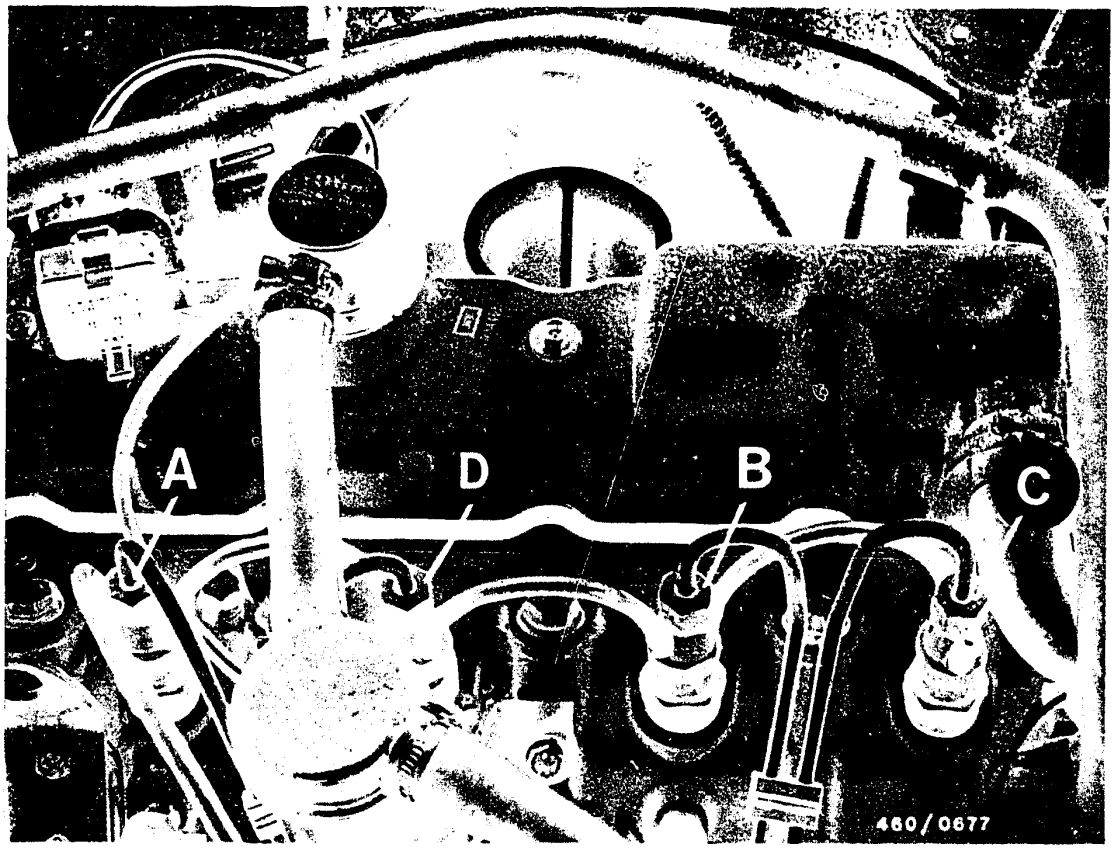
7. Check tank vent

Open tank filler cap.

If the fault disappears after opening the filler cap, the tank vent is defective.

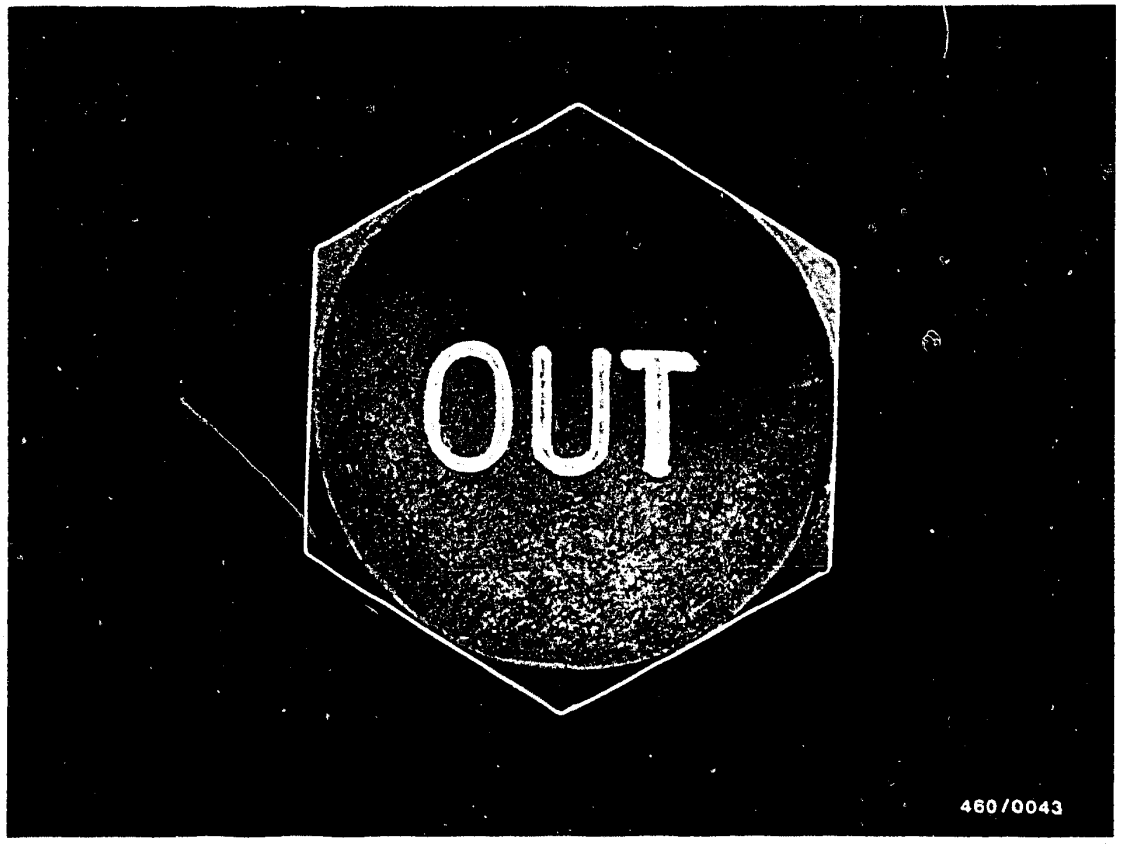
Remove tank-vent hose lines (picture) and check for clogging or constriction.

If necessary, check fitting on tank.



8. Check routing of fuel-injection tubing

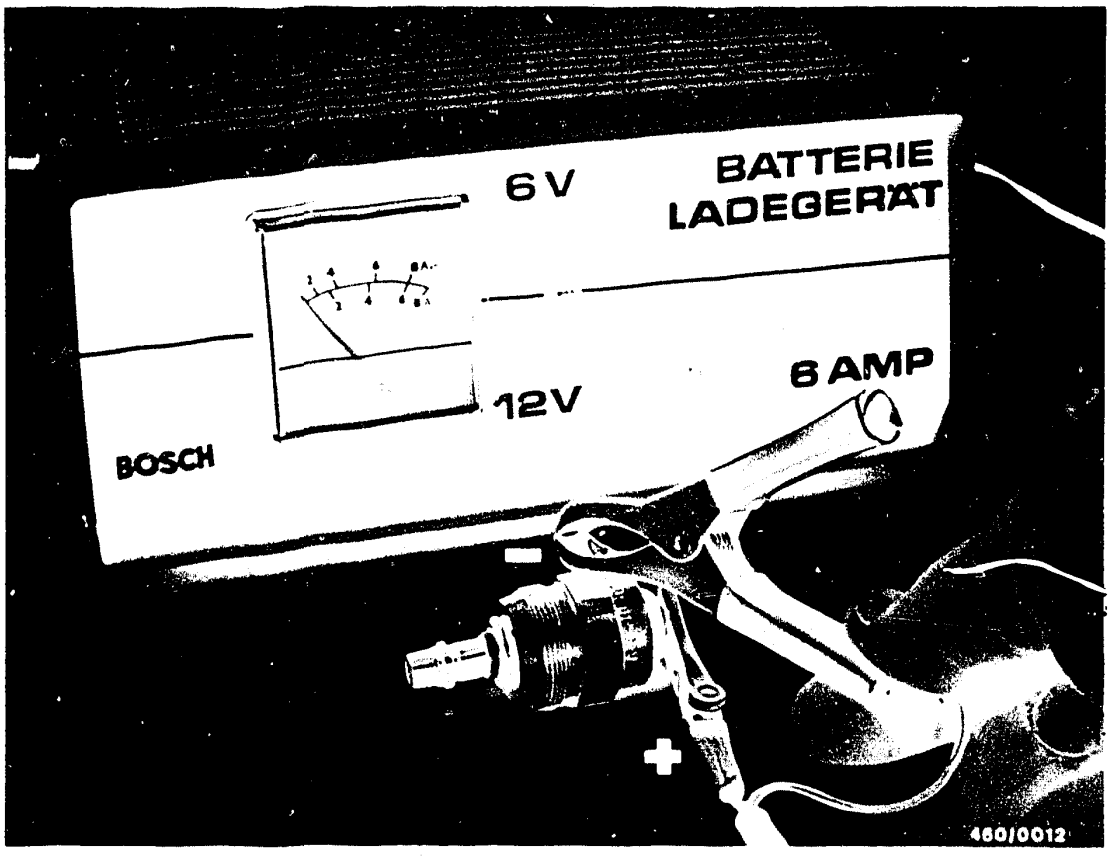
The fuel-injection lines are joined together by clamps so that it is impossible to mix up the outlets.
If, however, there is any doubt, check the routing of the lines as shown in the picture above. The pairing of the fuel-injection pump outlets with the individual engine cylinders is identified by the letters A - D.



9. Check overflow restriction

Unscrew overflow restriction on fuel-injection pump (marked "out").

Perform visual inspection of wire screen for impurities. If in doubt, replace overflow restriction.



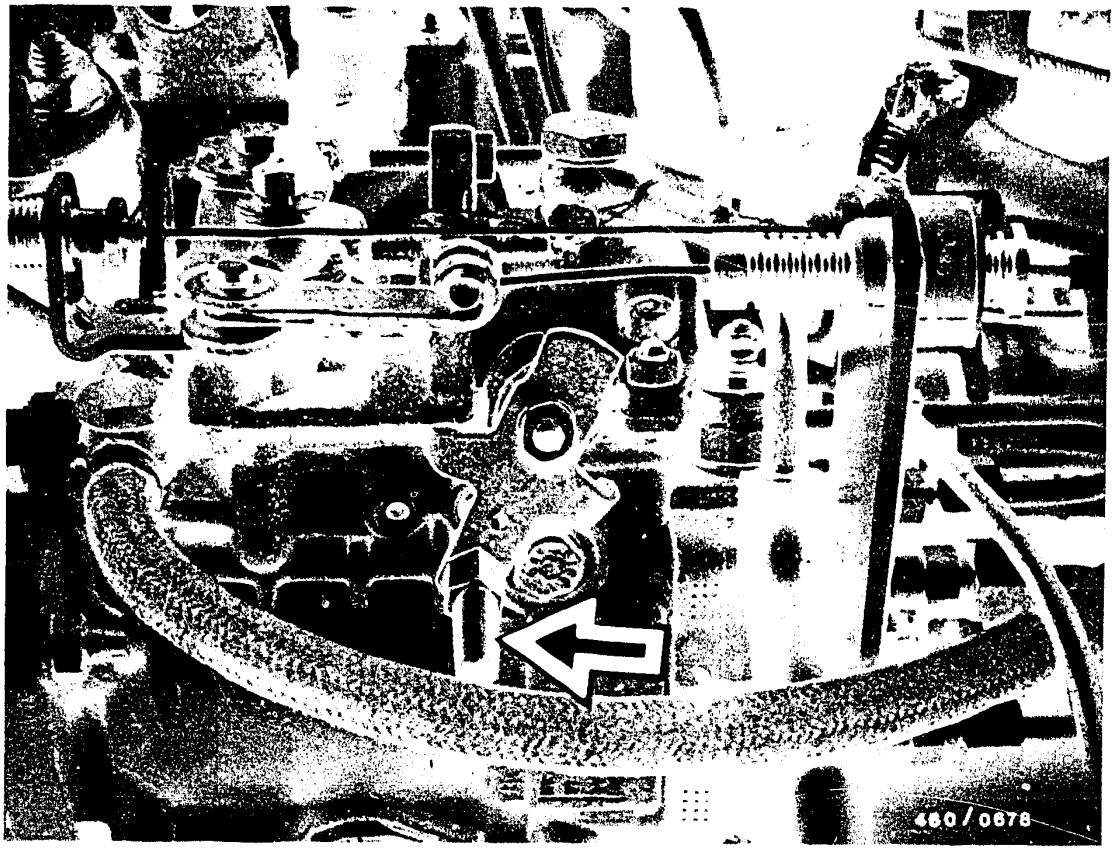
10. Check operation of shutoff device

10.1 Engine fails to start

Check whether solenoid-operated valve is supplied with voltage (min. 10 V) with glow-plug and starter switch switched on (drive position).
If voltage is present, remove fuel-injection tubing and take out solenoid-operated valve.
Cleanliness is essential.

When removed, check operation of solenoid-operated valve.

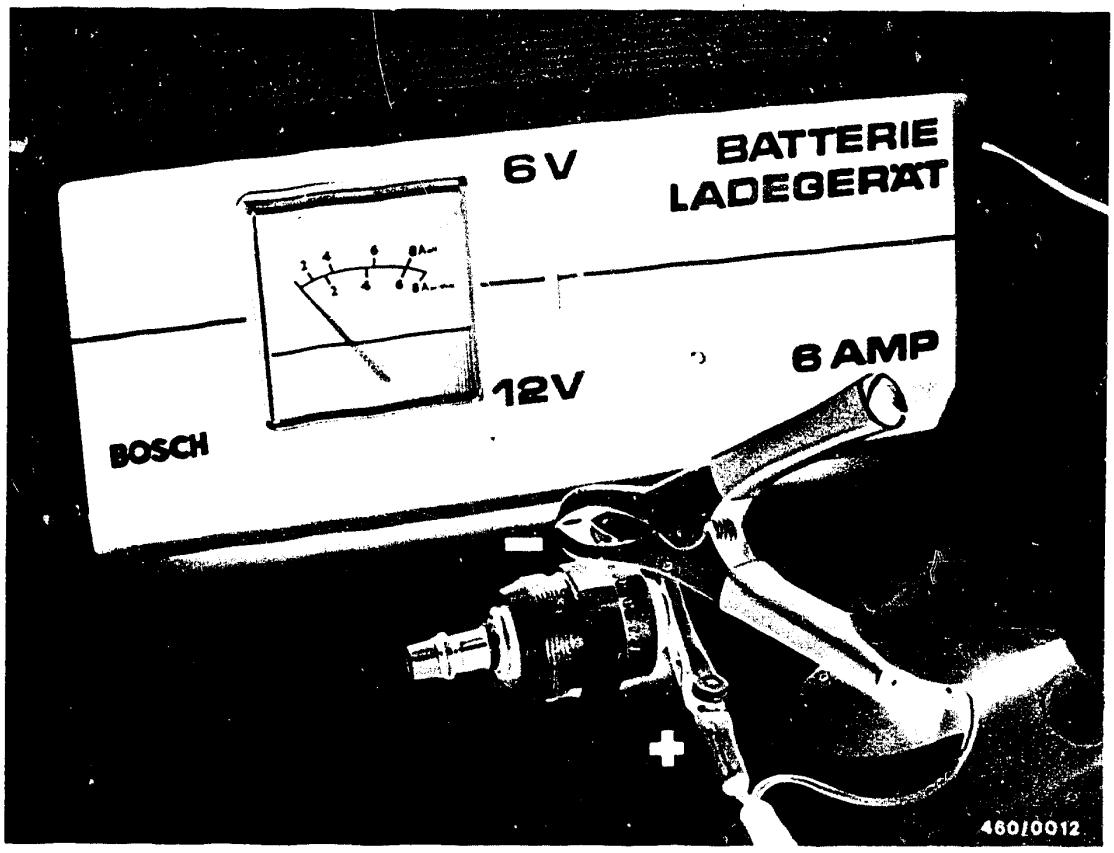
Note:
When removed, the solenoid-operated valve must only be supplied with voltage for a short period of time since it is no longer being cooled by the fuel.



10.2 Engine cannot be switched off

With the glow-plug and starter switch in the stop position, there must be no voltage across the solenoid-operated valve, i.e. the fuel inlet to the distributor-pump plunger is interrupted.

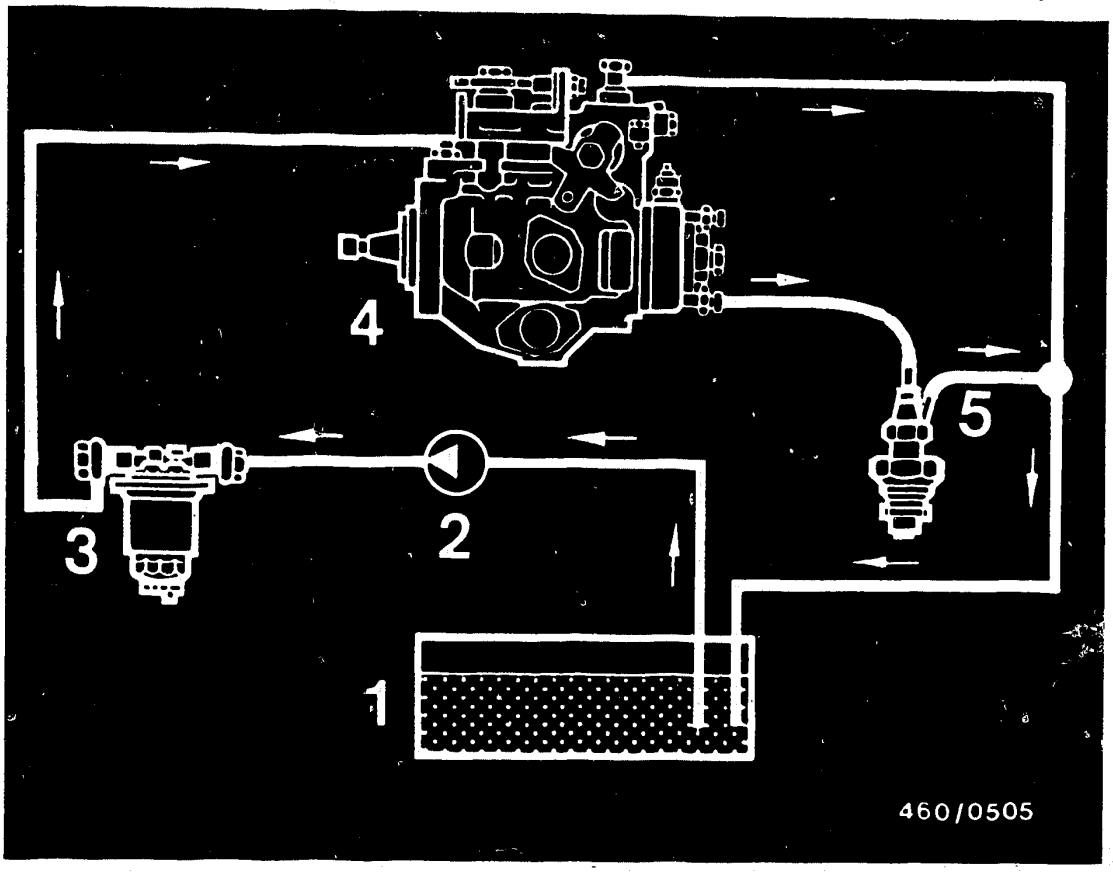
If the engine continues to run although there is no voltage across the solenoid-operated valve, operate the emergency stop lever (arrow) on the fuel-injection pump.



10.3 Solenoid-operated valve test

Remove fuel-injection tubing.
Take out solenoid-operated valve.
Cleanliness is essential.
When removed, check operation of solenoid-operated valve.

Note:
When removed, the solenoid-operated valve must only be supplied with voltage for a short period of time since it is no longer being cooled by the fuel.
Check valve seat in hydraulic head (visual inspection).

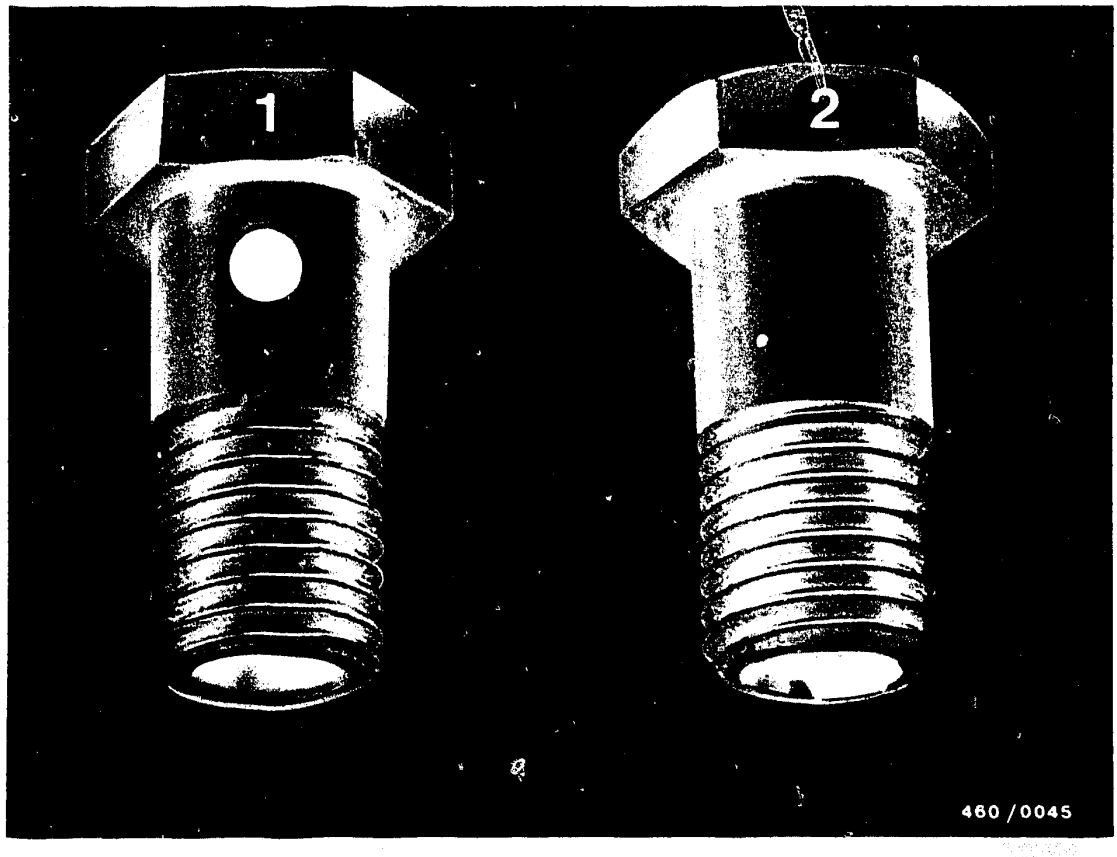


1 = Fuel tank
2 = Fuel pre-supply pump (only on export models)
3 = Fuel filter
4 = Distributor-type injection pump
5 = Injection nozzles

11. Diagram of fuel lines

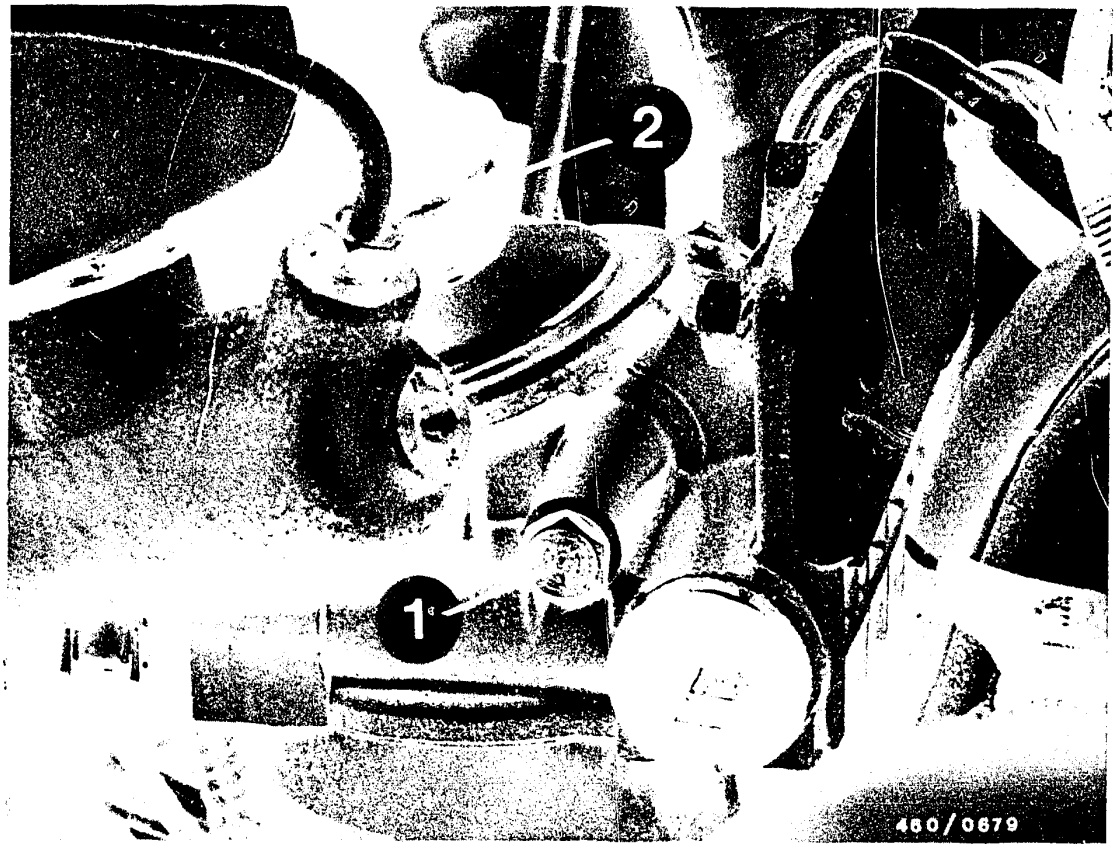
The fuel lines are connected as shown in the above diagram.

The fuel flows in the direction of the arrows.



As regards the connections to the fuel-injection pump, ensure that the inlet-union screw for fuel inlet (1) and the throttle screw for fuel return (2) are not mixed up.

The throttle screw is located on the cover of the fuel-injection pump and the head of the screw is marked with the word "out".



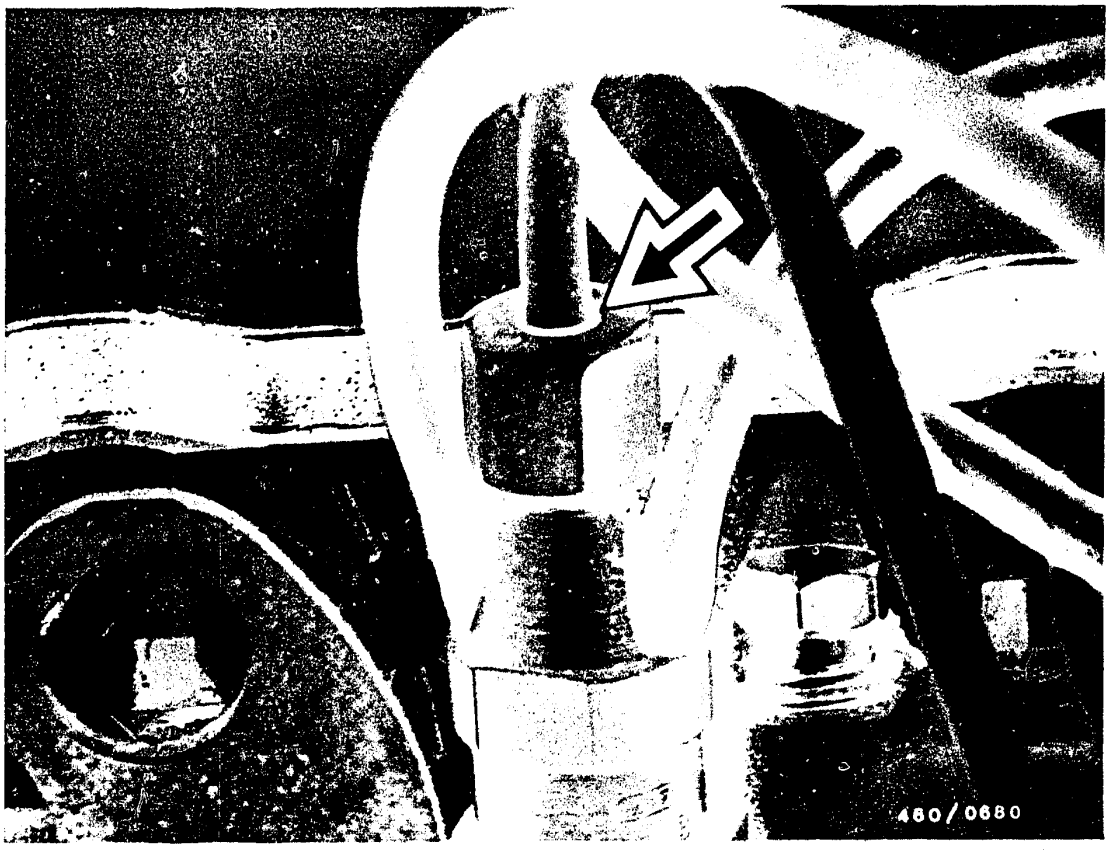
1 = Bleeder screw 2 = Hand primer

12. Bleed fuel system

Loosen bleeder screw on fuel filter and operate hand primer until fuel escaping from bleeder screw is free of bubbles.

Tighten bleeder screw.

Continue to operate hand primer until resistance can be felt.

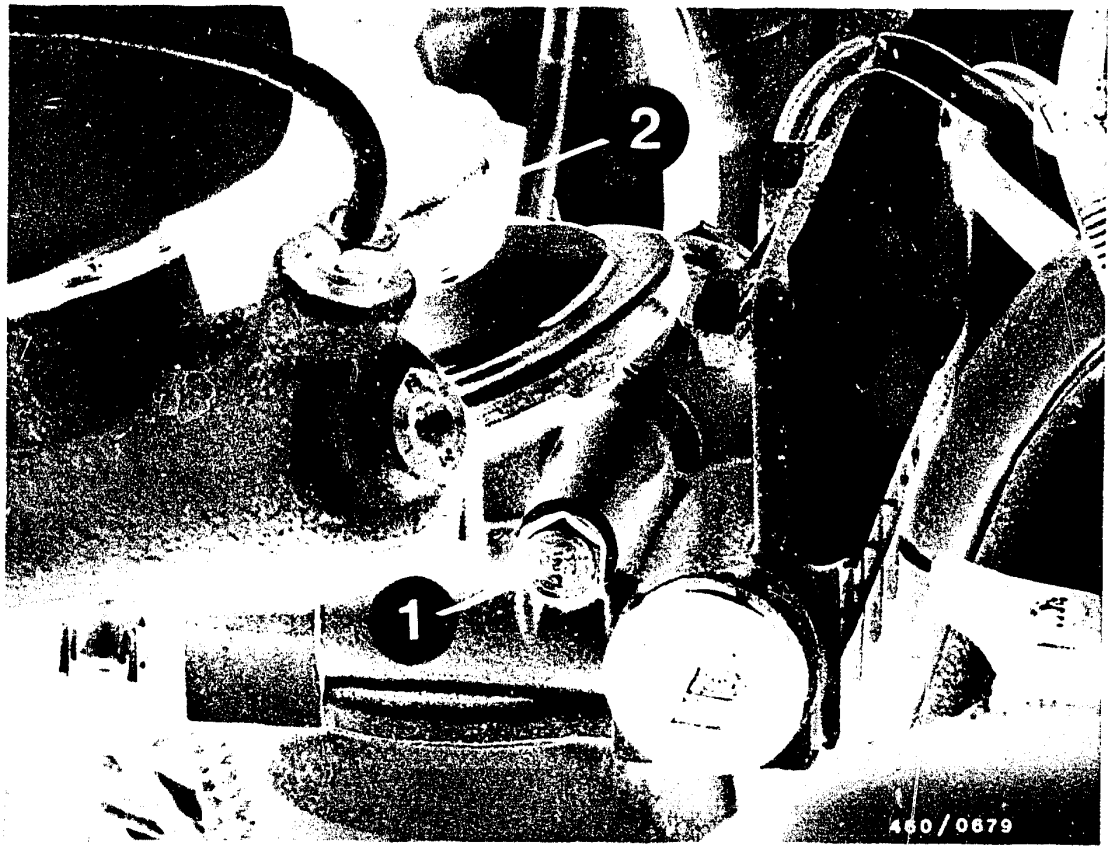


Loosen union nuts of fuel-injection tubing on nozzle-holder assemblies.

Operate starting motor without preheating until fuel escapes from union nuts of nozzle-holder assemblies (arrow).

Tighten union nuts.

Operate starting motor until engine starts.



1 = Bleeder screw

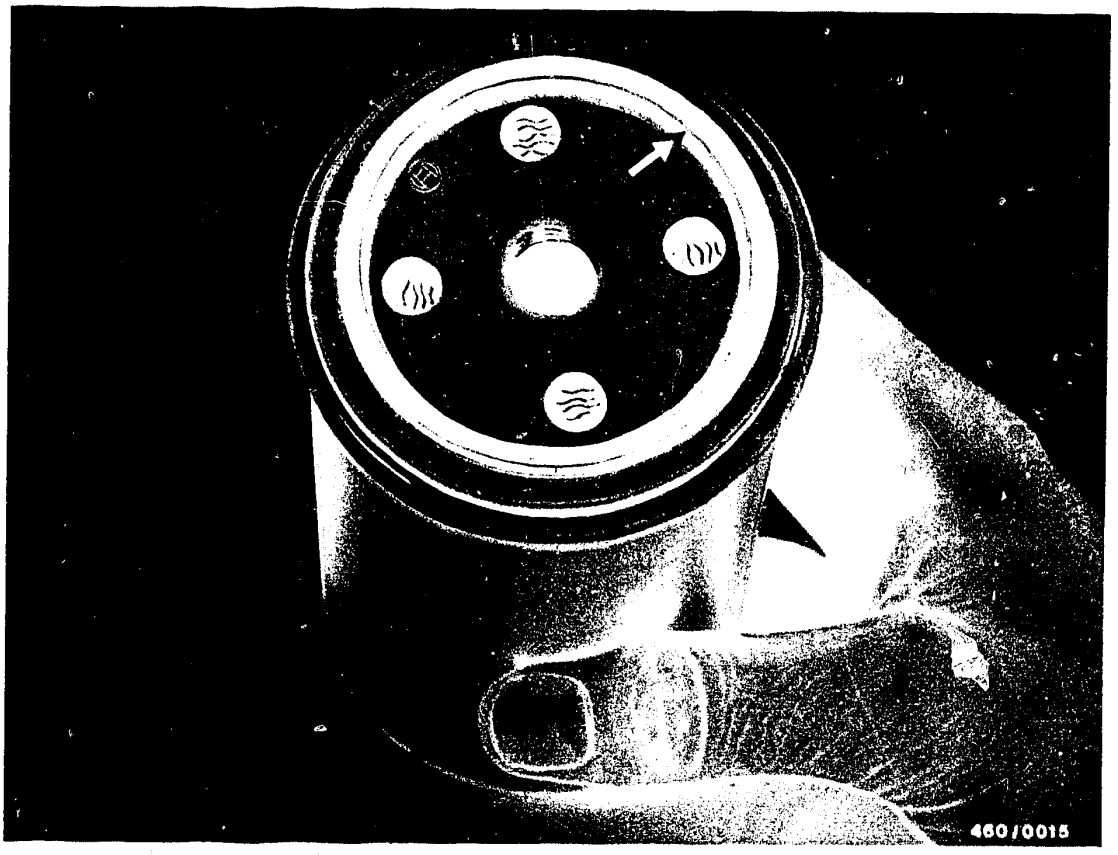
2 = Hand primer

13. Replace and drain water from filter box

13.1 Replace filter box

Unscrew filter box and drain.

If stuck, loosen filter box with special wrench e.g. Matra W 167.

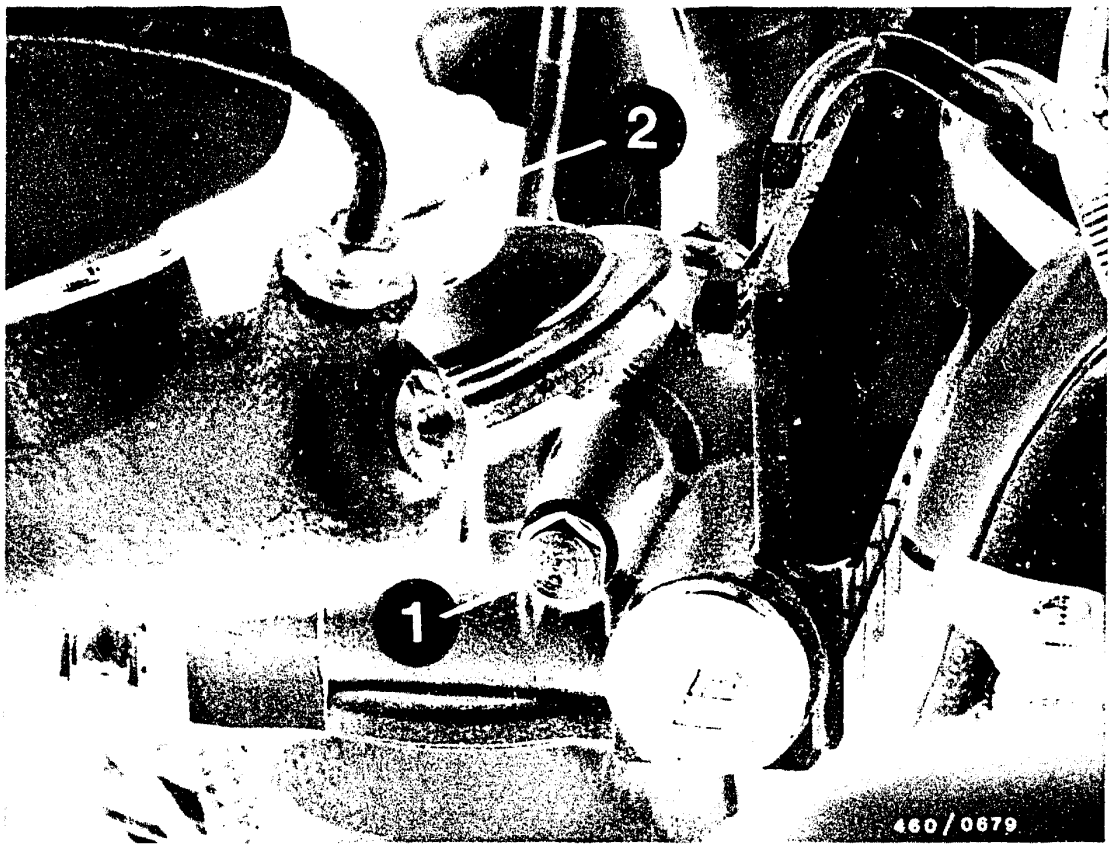


Rub diesel fuel into the rubber seal (arrow) of the new filter box.

Screw the filter box into the cover by hand and tighten.

Check the fuel filter for leaks.

In the case of winter fuel it may be necessary to add petroleum as specified by the vehicle manufacturer.



1 = Bleeder screw 2 = Hand primer

13.2 Drain water from fuel filter

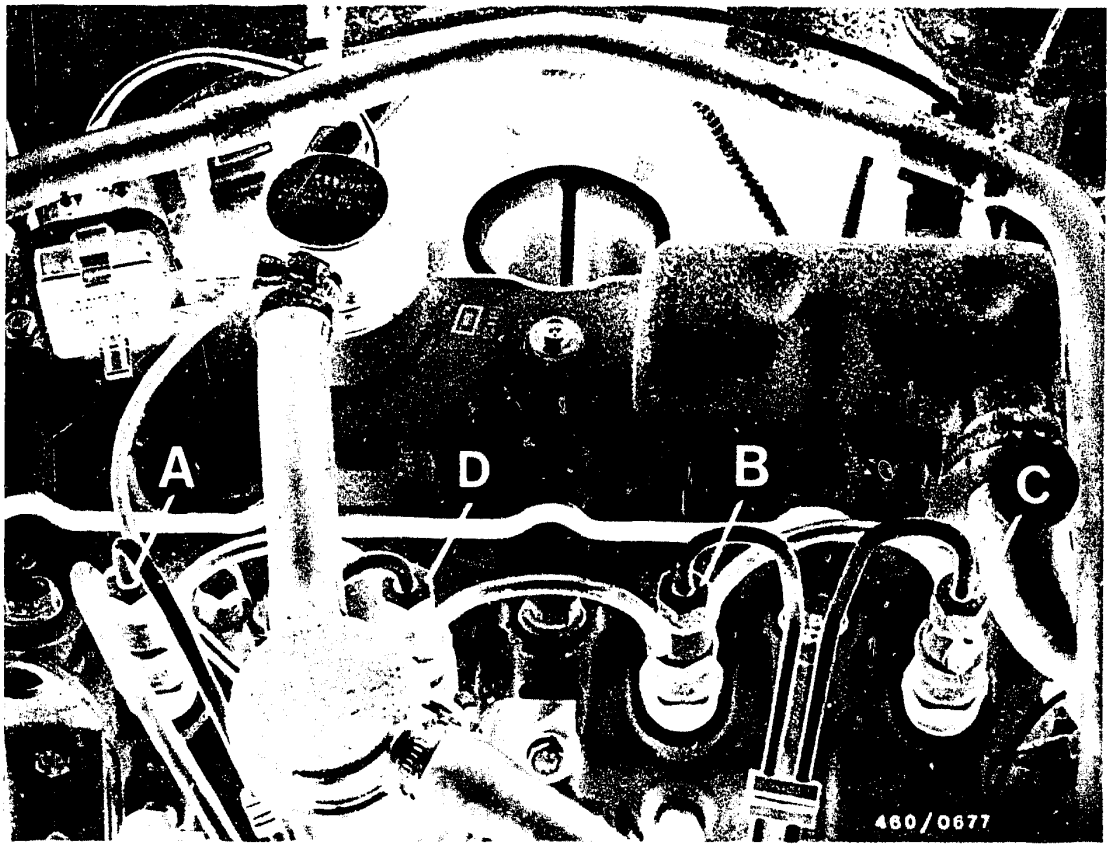
Loosen bleeder screw on filter cover by a few turns.

Loosen water-drain plug on base of filter (not visible in picture) and drain water.

Catch liquid in collector vessel.

Tighten water-drain plug and bleeder screw and check for leaks.

If necessary, bleed fuel filter.



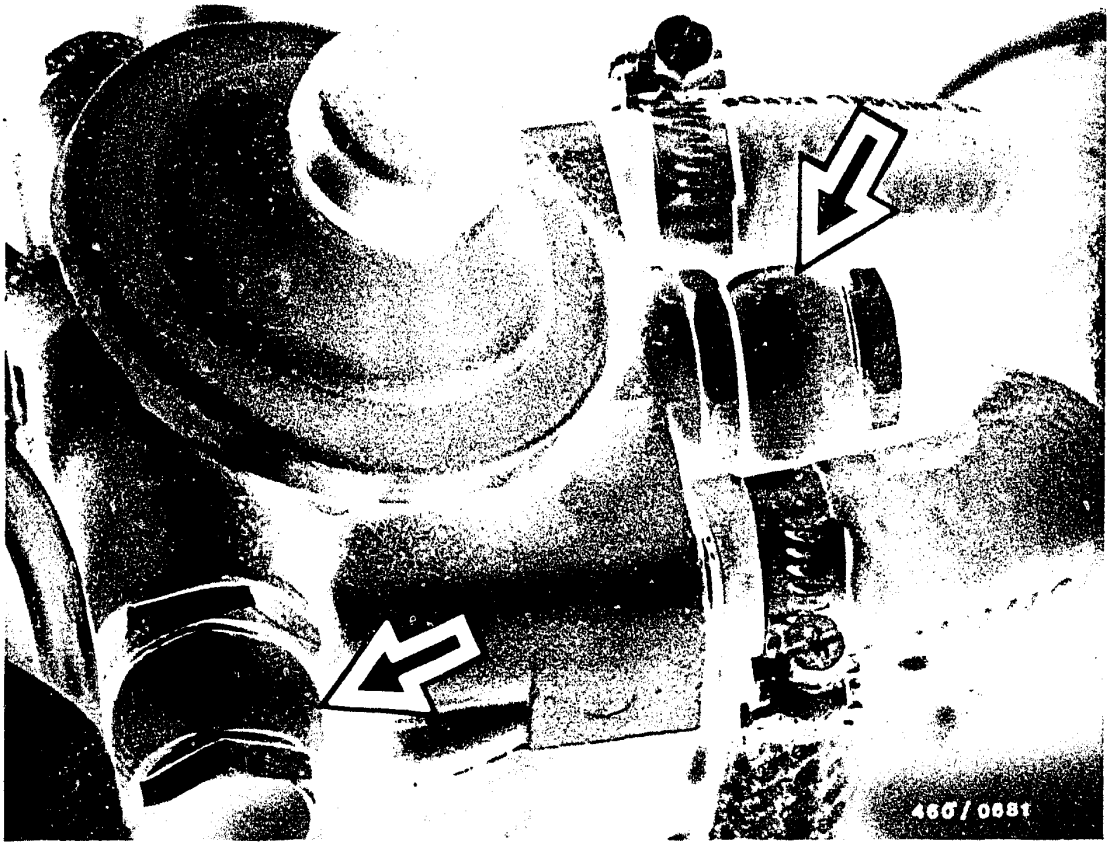
14. Test Injection System for Leaks

Perform leak test with engine at normal operating temperature.

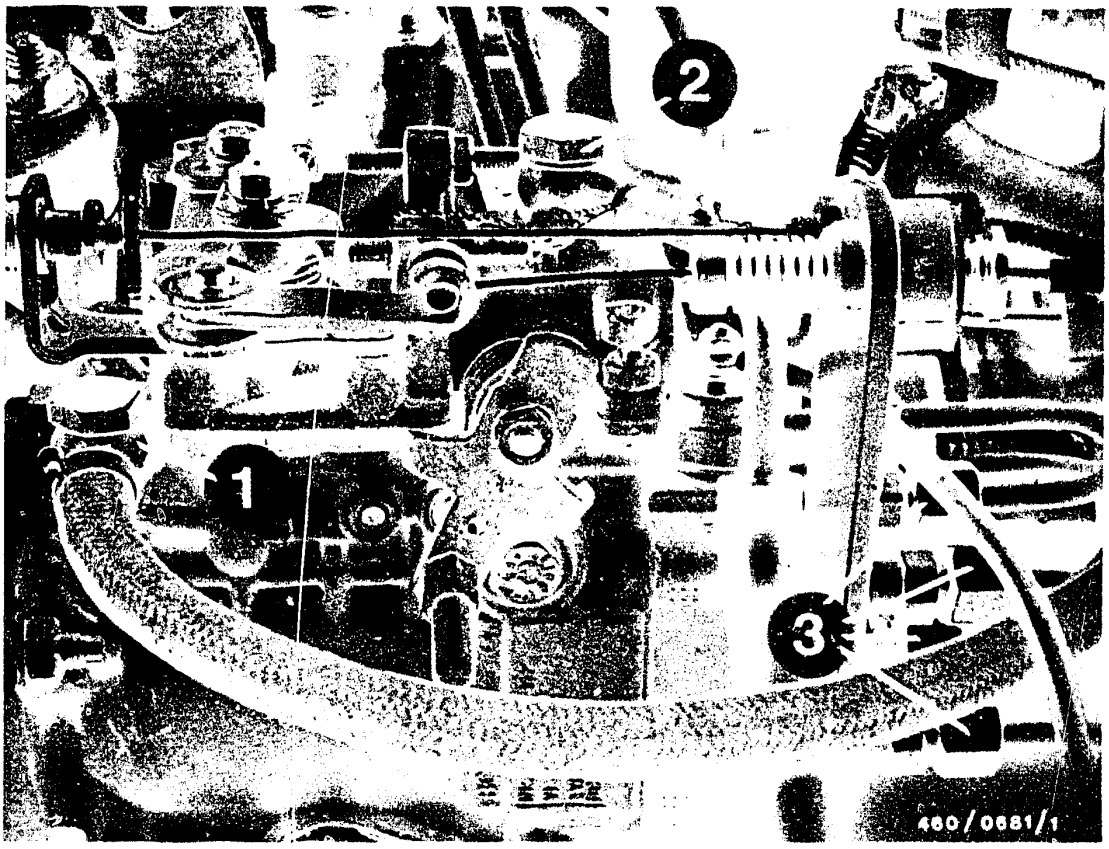
Examine all connection points of fuel lines.

Pay particular attention to:

- Connections on nozzle-holder assemblies (A...D).

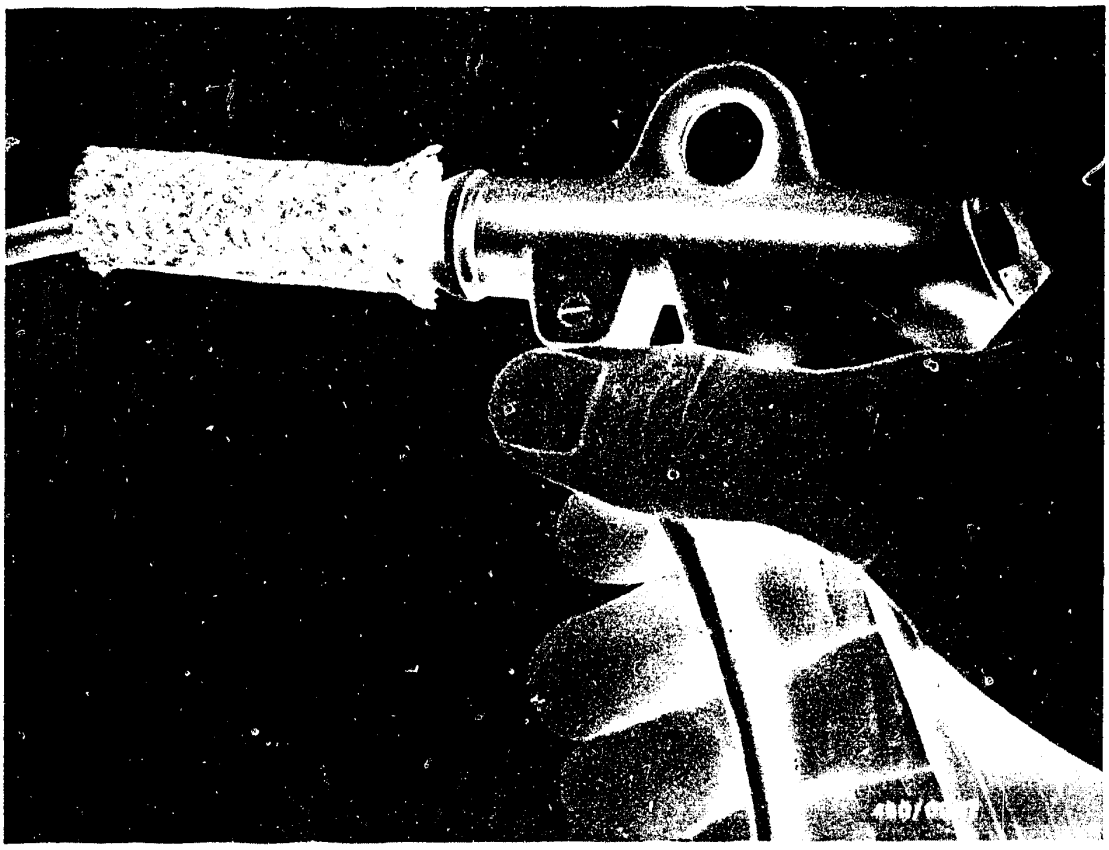


- Connections on fuel filter (arrows).



- Inlet line (1) and return line (2) on distributor-type injection pump.
- Delivery-valve holders on hydraulic head (3).

Examine fuel lines for hairline cracks.



15. Check fuel lines

Subject suspect fuel lines to a visual inspection.

If there is no detectable pinching or kinking, the fuel line in question must be removed.

Check fuel line for throughflow using compressed air and clean if necessary.

A suitable hose piece may be used as a side seal for blowing out the fuel lines.

16. Smoke test - check air filter

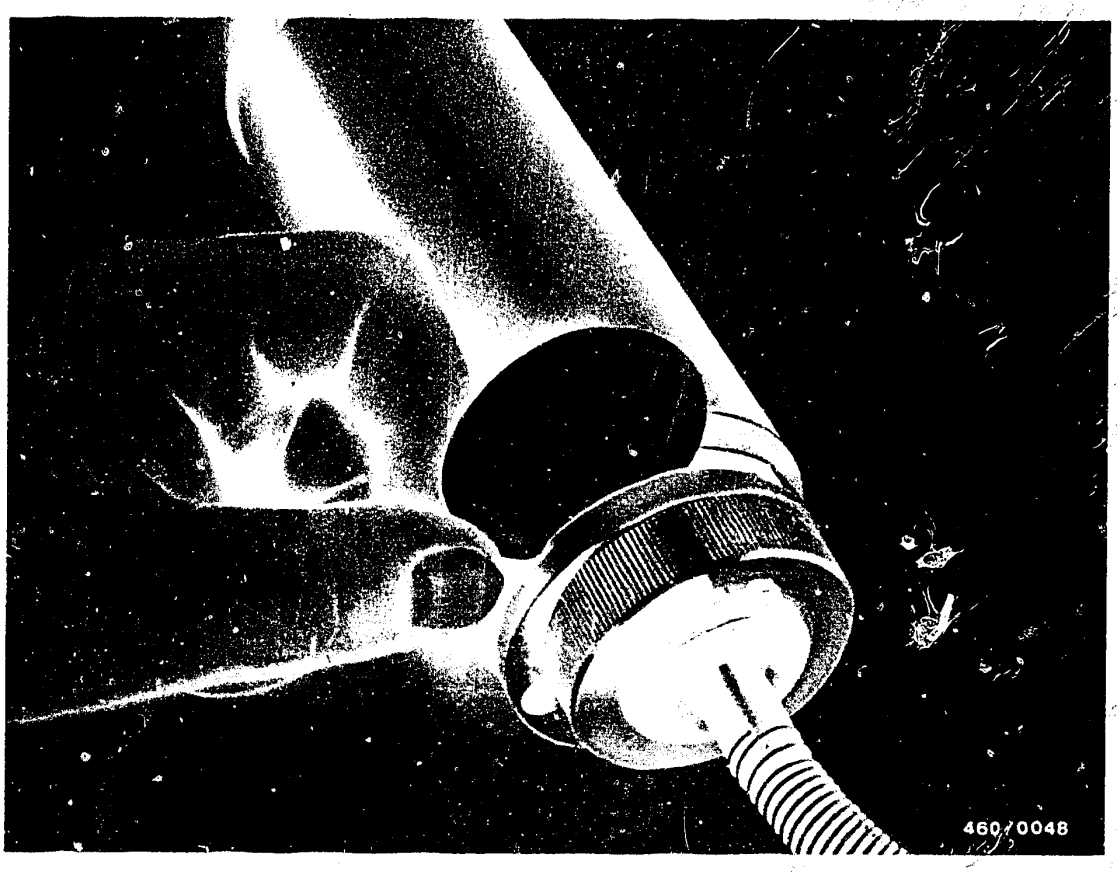
16.1 Smoke test

Summary of the contents of the legal regulations (as at April 1978). Applicable to Federal Republic of Germany.

This regulation applies only to the homologation of motor vehicles having at least 4 wheels with a maximum permissible speed of more than 25 km/h. A smoke emission test is not prescribed for official general inspections.

Parts which may have an influence on environmental pollution must be designed in such a way that the legal requirements are met during operation and despite vehicle vibration.

This applies in particular to cold-start devices and full-load stops. The Rheinland-Westfälische TOV (Technical Inspection Bureau of Rhineland-Westfalia) in Essen is the sole approval agency.

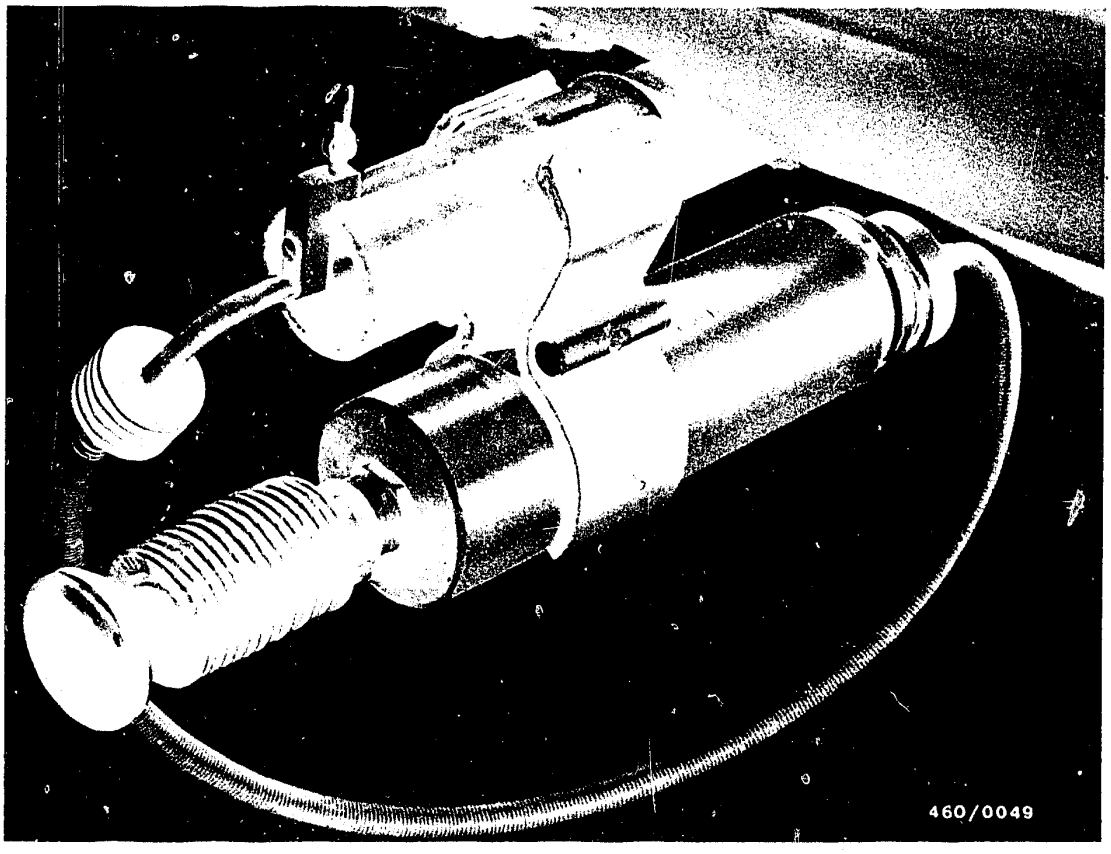


16.2 Test setup

The smoke test is conducted using the Bosch filter-type smokemeter.
The filter-type smokemeter consists of the following units:

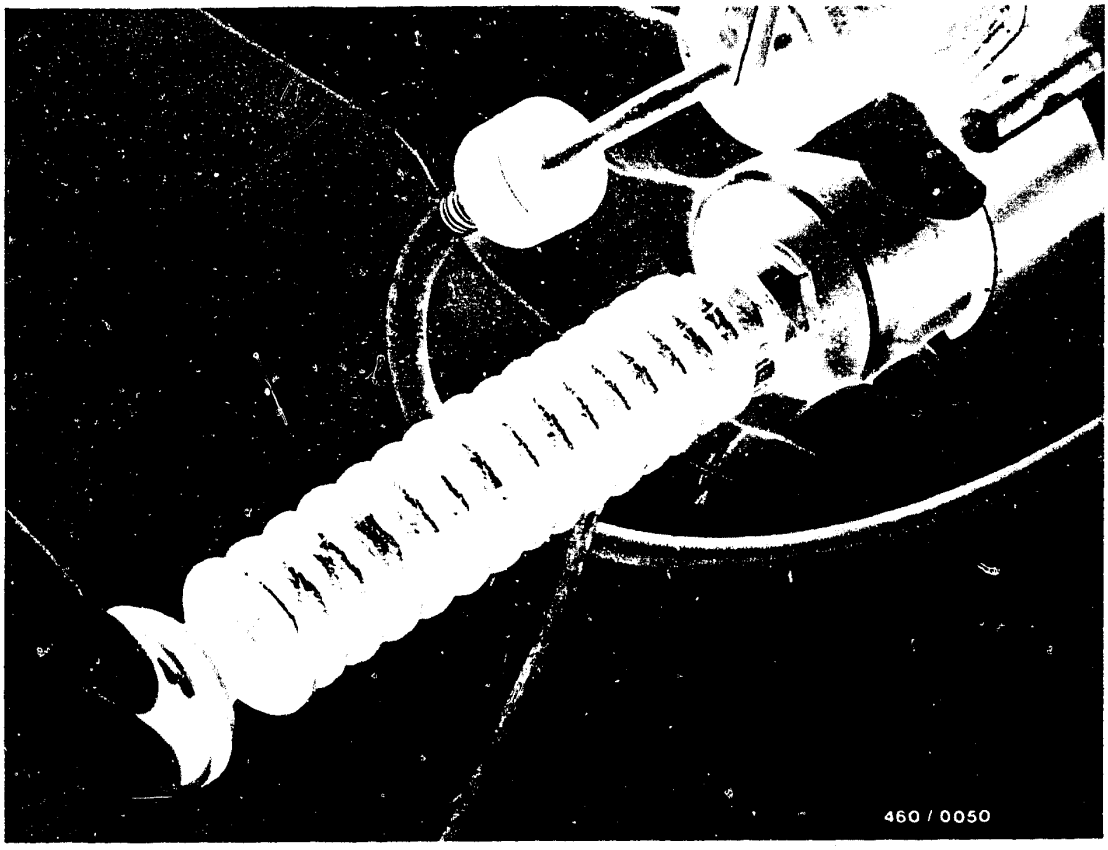
Accessories box with proportioning pump	0 681 169 038
Evaluating unit	0 684 102 050

Insert filter plate into proportioning pump.



Mount sampling pump on exhaust pipe using appropriate clamp.

Introduce exhaust-sample pickup as far as possible into exhaust pipe and clamp in position.

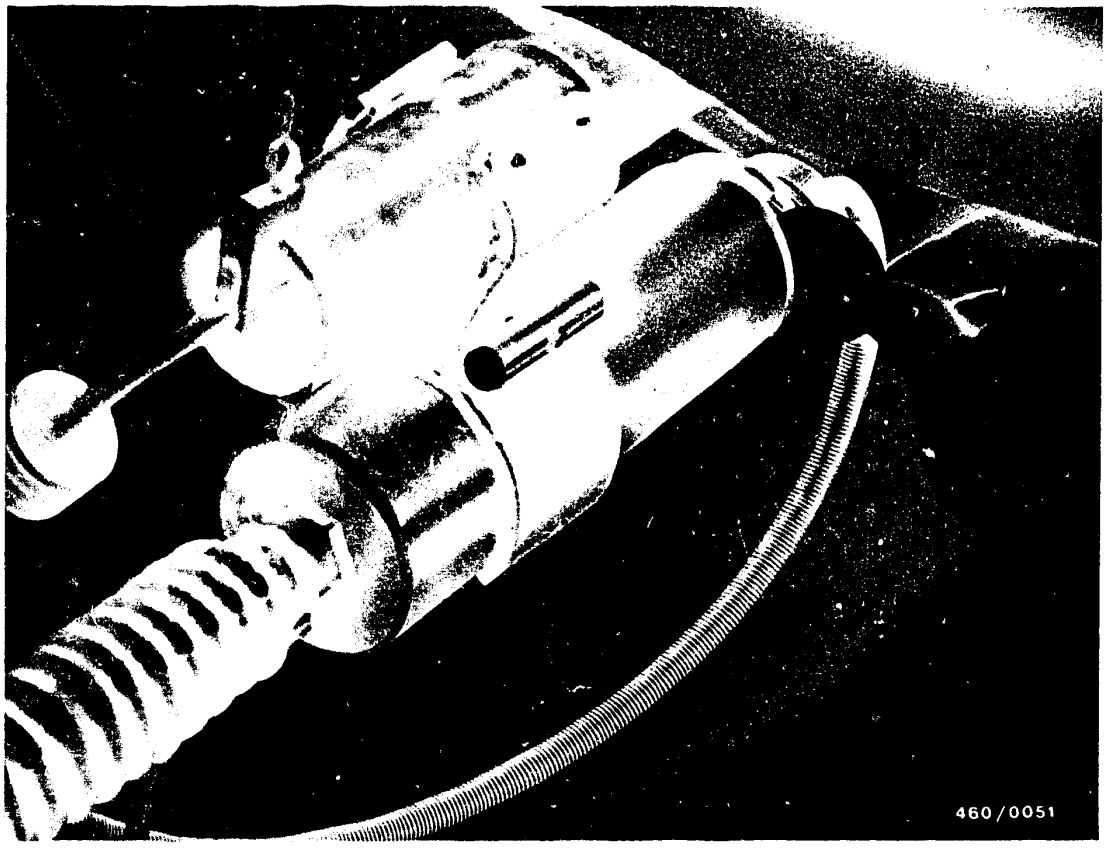


16.3 Test procedure

Set proportioning pump by pressing in the black push-button.
Take rubber ball on triggering hose and enter passenger compartment.

The test can be performed on the chassis dynamometer or on the road (gradient).

The chassis dynamometer is preferable in any case. Find the gear in which, with the accelerator pedal in the full-load position, a speed of approx. 40 km/h is reached. Load the engine so that, with the accelerator in the same position, a speed of approx. 25 km/h is reached.

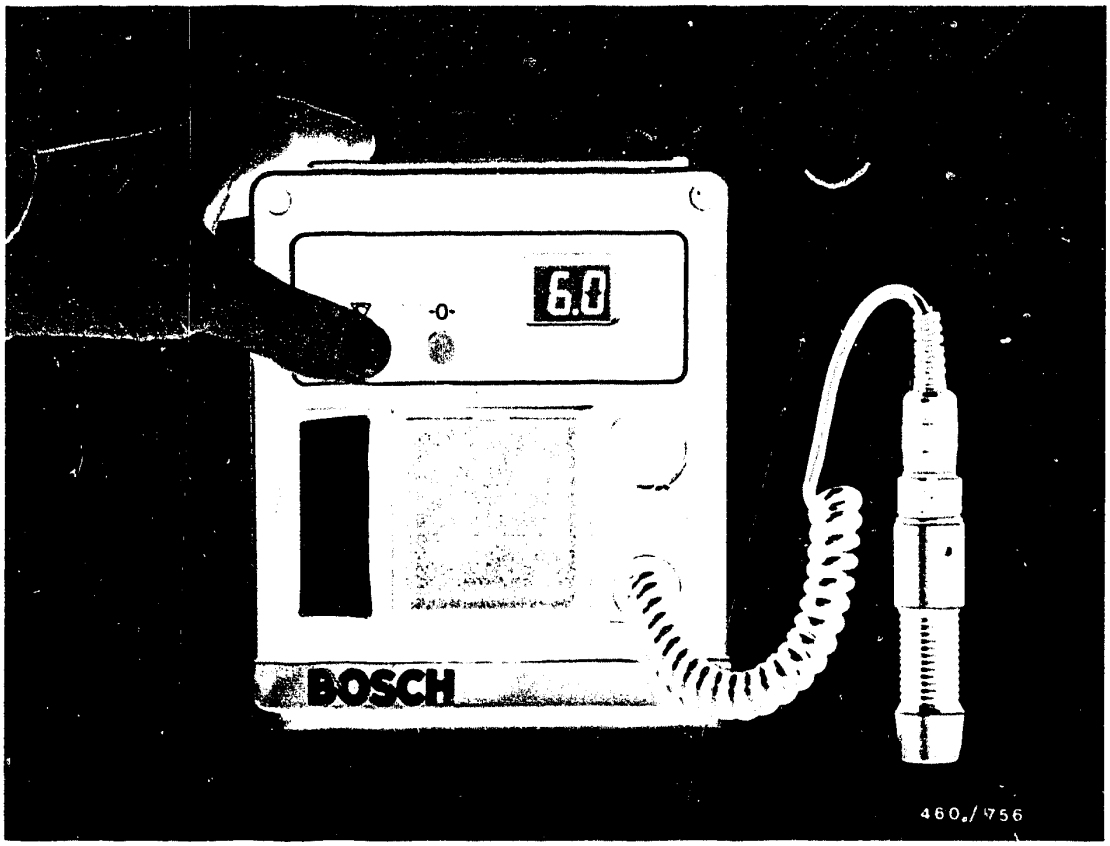


Maintain this load condition for 5 seconds and then trigger the sampling pump by pressing the rubber ball.

Switch off engine.

Caution!
During the following operation, pay attention to the fact that the exhaust pipe has been heated due to the running of the engine.

Remove filter plate from sampling pump.



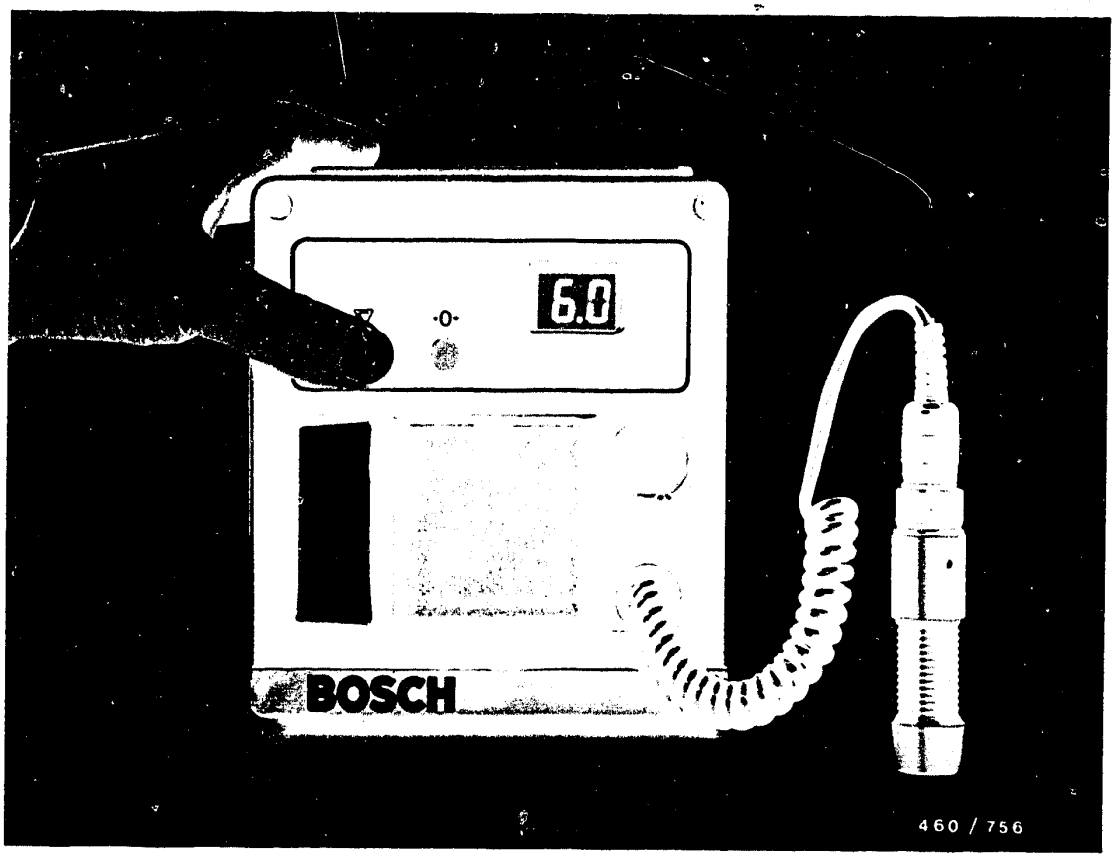
Setting the Zero Point

The zero point adjustment must be performed

- before each measurement series
- if there are changes in ambient conditions
- each time the lens of the photo-element adapter has been cleaned.

Firmly press the measuring head of the photo-element adapter onto 5 clean, white filter plates placed one on top of the other.

Press button "0" until display 0.0 appears.
Release button "0".



Measuring

With the sooted side at the top, lay filter plate from metering unit on 3 new filter plates placed one on top of the other.

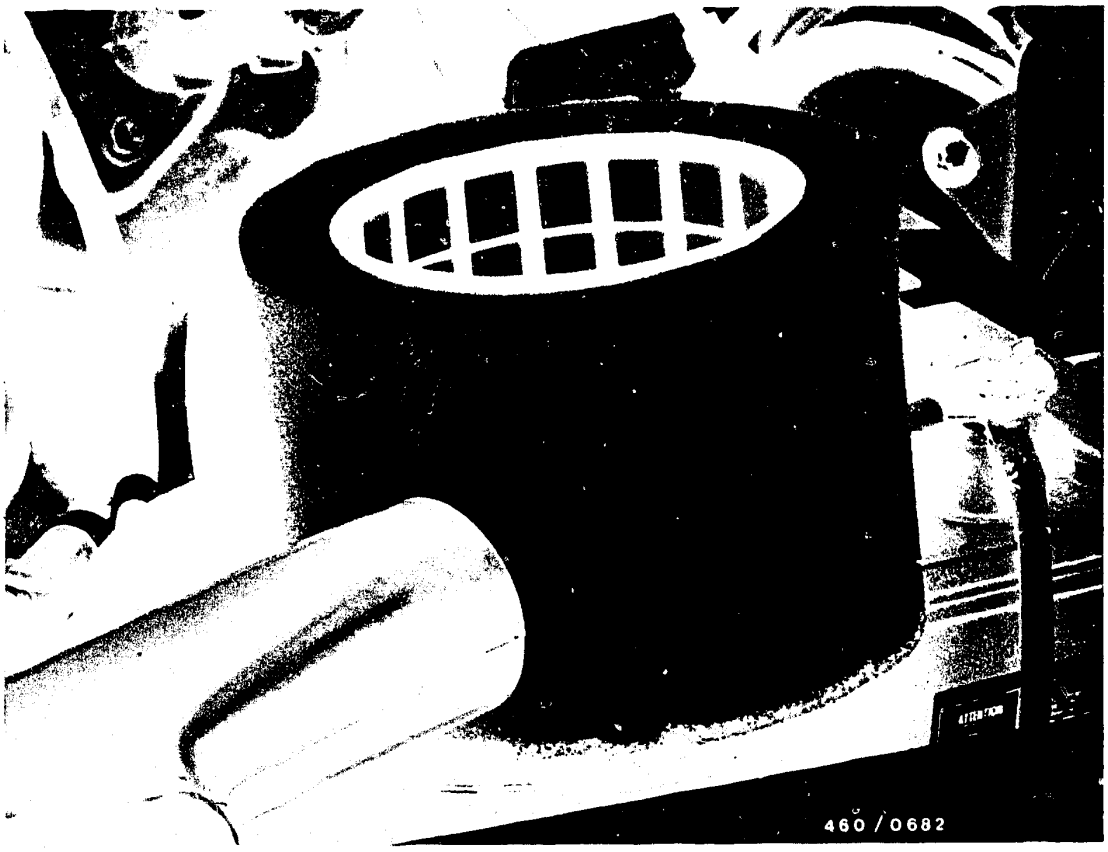
Press measuring head vertically onto black surface of filter plate.

Simultaneously press button "C" until the measured smoke number appears on the display.

Note:

Measuring head must be firmly mounted both for the zero point adjustment and for measuring (even slight tilting may lead to incorrect measurements).

Compare the smoke number with the evaluation sheet. Note kW (HP) information of vehicle manufacturer.



16.4 Check air filter

Remove air filter and subject to a visual examination.

Test criteria for air filter:

- Dusty air filter (test by knocking out air filter)
- Oil-fouled air filter
- Solid matter in air filter, e.g. leaves

If in doubt, use a new filter element.

17. Adjust idle speed

Connect tachometer (e.g. photoelectric) to engine.

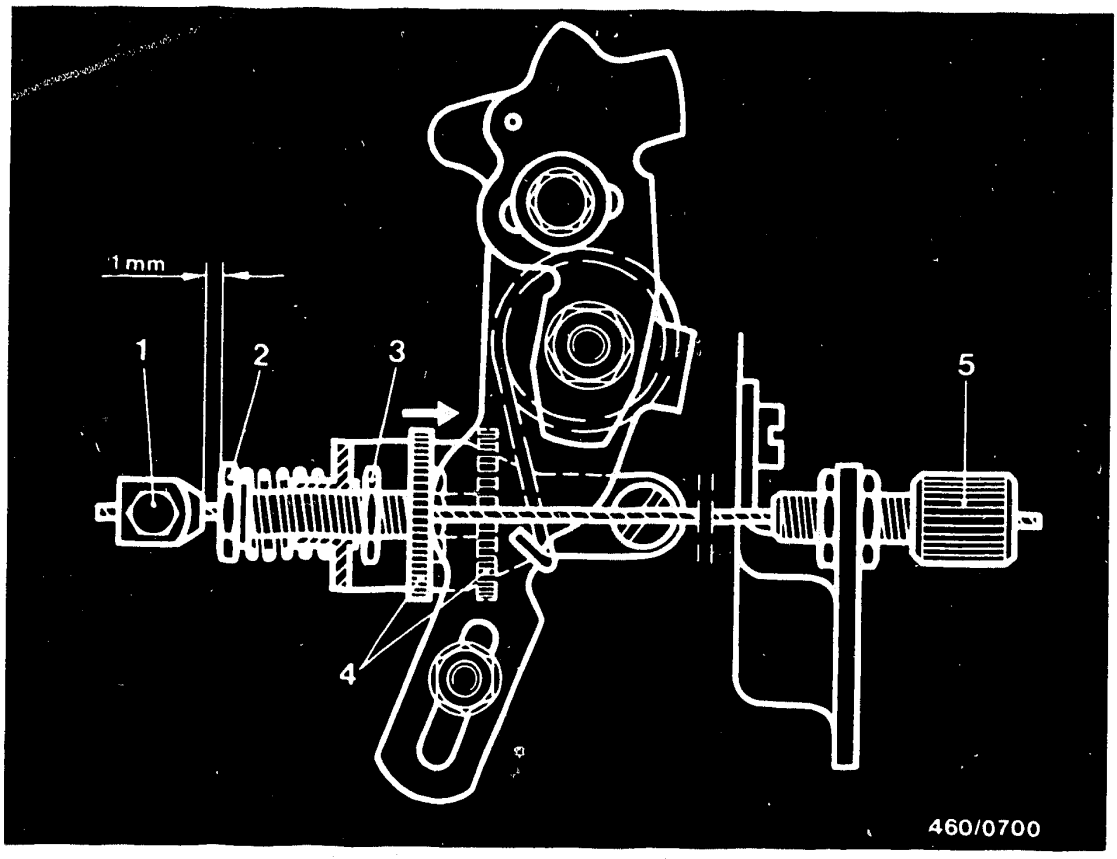
Note:

To adjust the idle speed, the engine must be at normal operating temperature, coolant temperature + 80°C.

Set the engine speed to 800 + 50 min^{-1} at the idle-adjusting screw (arrow).

Note that the camshaft and injection pump are driven at half the engine speed.

After adjusting, lock and seal adjusting screw.



17.1 Adjust idle-speed increase

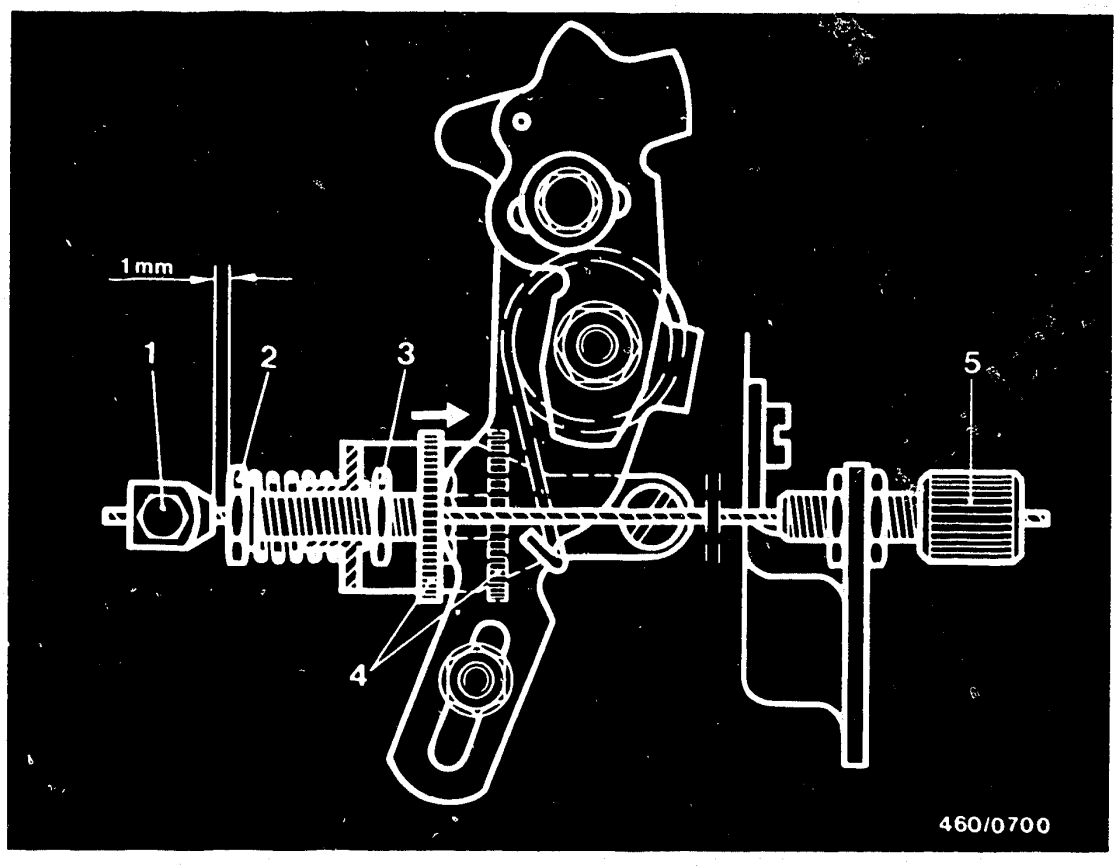
With the idle-speed increase off, there must be a gap of 1 mm between clamping piece (1) and hexagon nut (2).

Correct by means of clamping piece (1).

Start engine and warm up until radiator fan cuts in.

Operate idle-speed increase.

Engine speed must then be 1200 $\pm$ 50 min^{-1}.



If a correction is necessary, loosen lock nut (3).

Hold hexagon nut (2) with a wrench and turn knurled screw (4) until the correct engine speed 1200 $\pm$ 50 min^{-1} is reached.

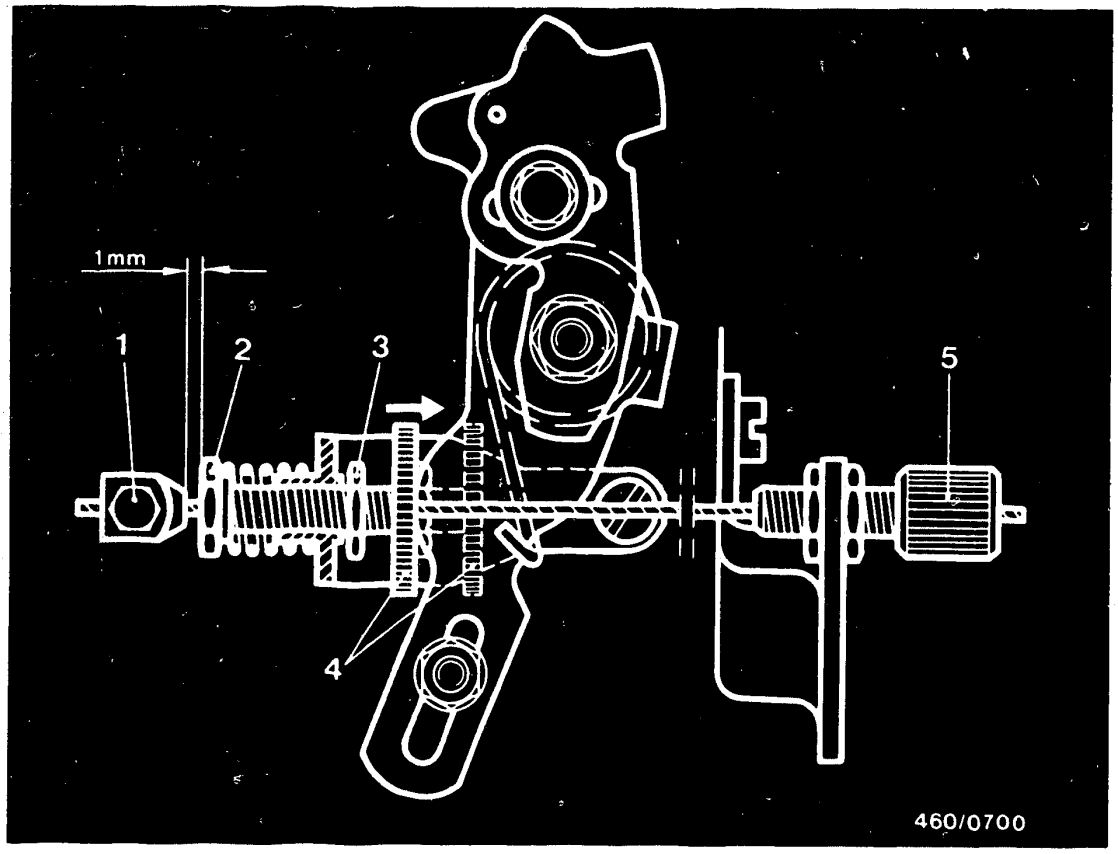
Tighten lock nut (3), while holding knurled screw (4).

Switch off idle-speed increase.

Loosen lock nuts of knurled screw (5).

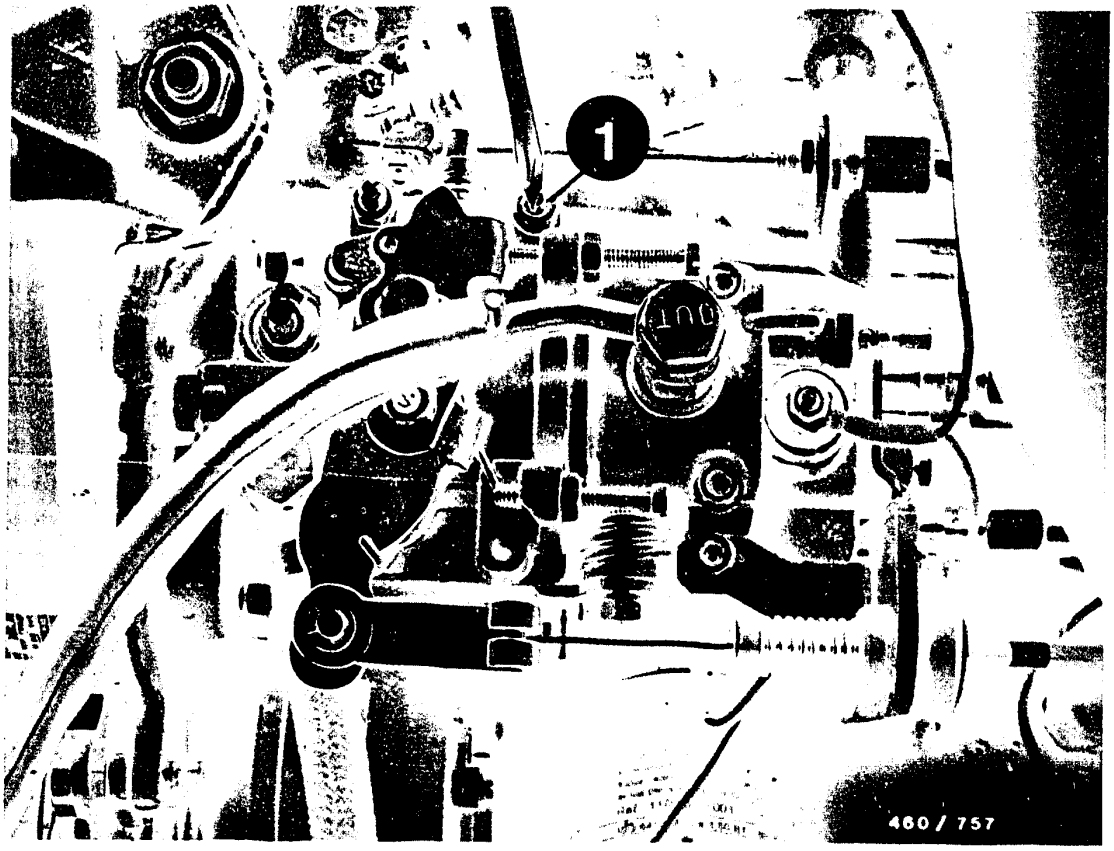
Bring knurled screw (5) up against sleeve of cable.

Re-tighten lock nut.



Check gap 1 mm between clamping screw (1) and hexagon nut (2).

If necessary, correct gap with clamping piece (1).



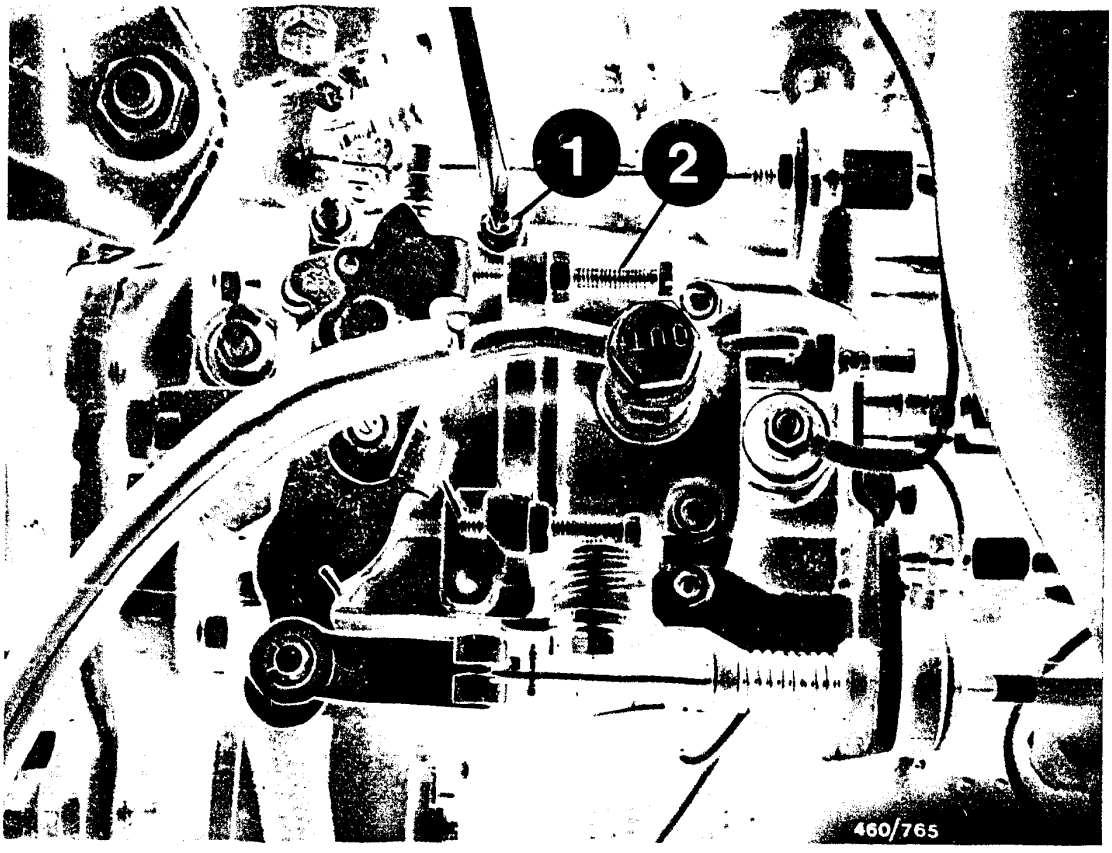
17.2 Adjust idle speed on injection pumps with housing-rigid idle spring (LFG)

Connect tachometer (e.g. photoelectric) to engine. Start engine and operate at idle speed.

Note:
For adjusting the idle speed the engine must be at normal operating temperature, coolant temperature +80° C.

Set engine speed at idle-speed adjusting screw (1) to 800 + 50 min-1.

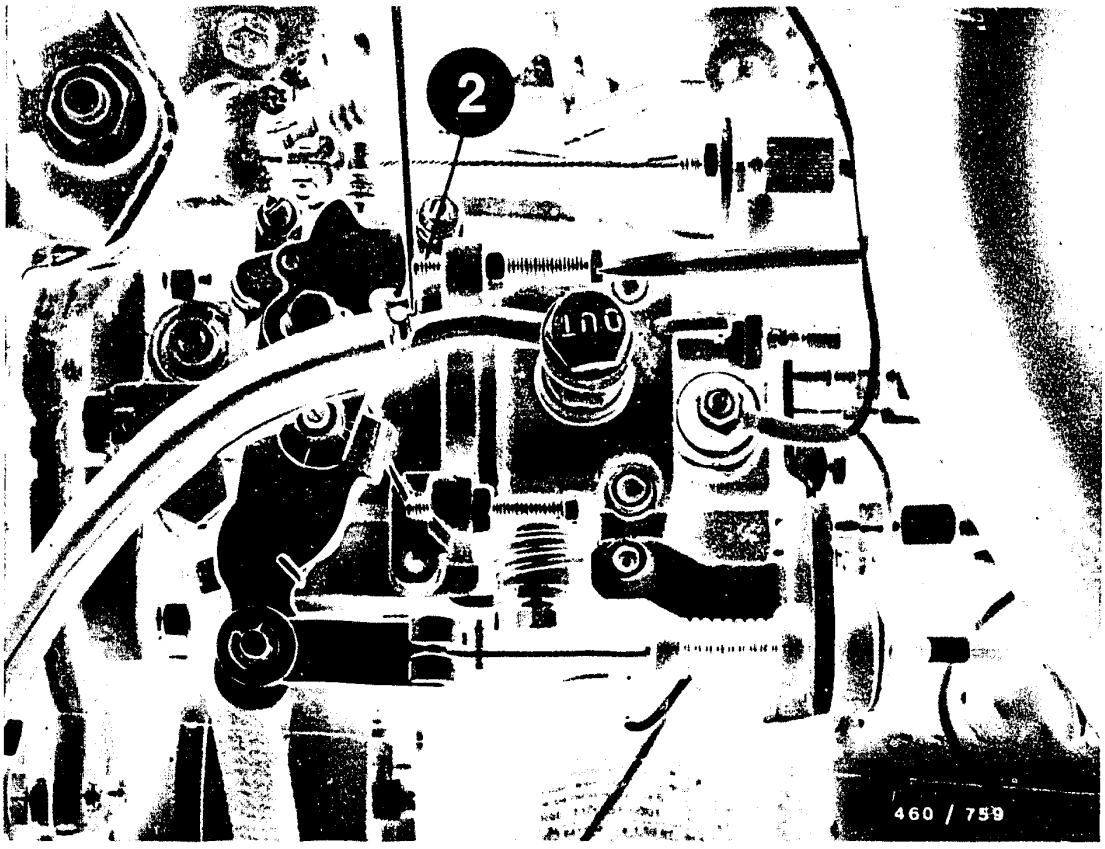
Note that the camshaft and the injection pump are driven at half the engine speed.



If the idle cannot be adjusted by turning the adjusting screw (1), the residual delivery is set too high.

In this case, proceed as follows:

- Unscrew idle-speed adjusting screw (1) toward lower idle speed.
- Unscrew residual-delivery adjusting screw (2) until engine speed drops.
- Then unscrew residual-delivery adjusting screw by a further 2 turns and adjust idle speed at adjusting screw (1).

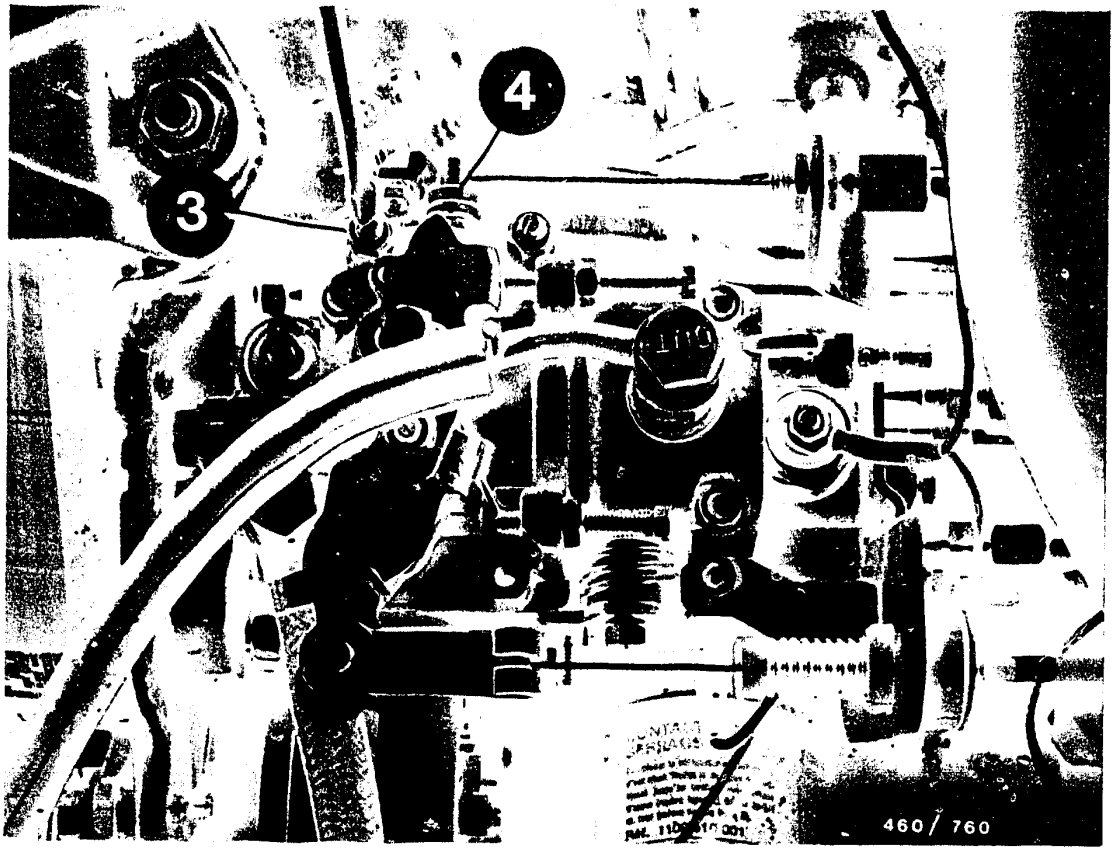


17.3 Adjust residual delivery

Insert a spacer piece (e.g. feeler gauge) of 1 mm between residual-delivery screw (2) and speed control lever.

Screw in residual-delivery adjusting screw (2) until the engine speed has risen by 20 revolutions as compared to the set idle speed.

Remove spacer piece.

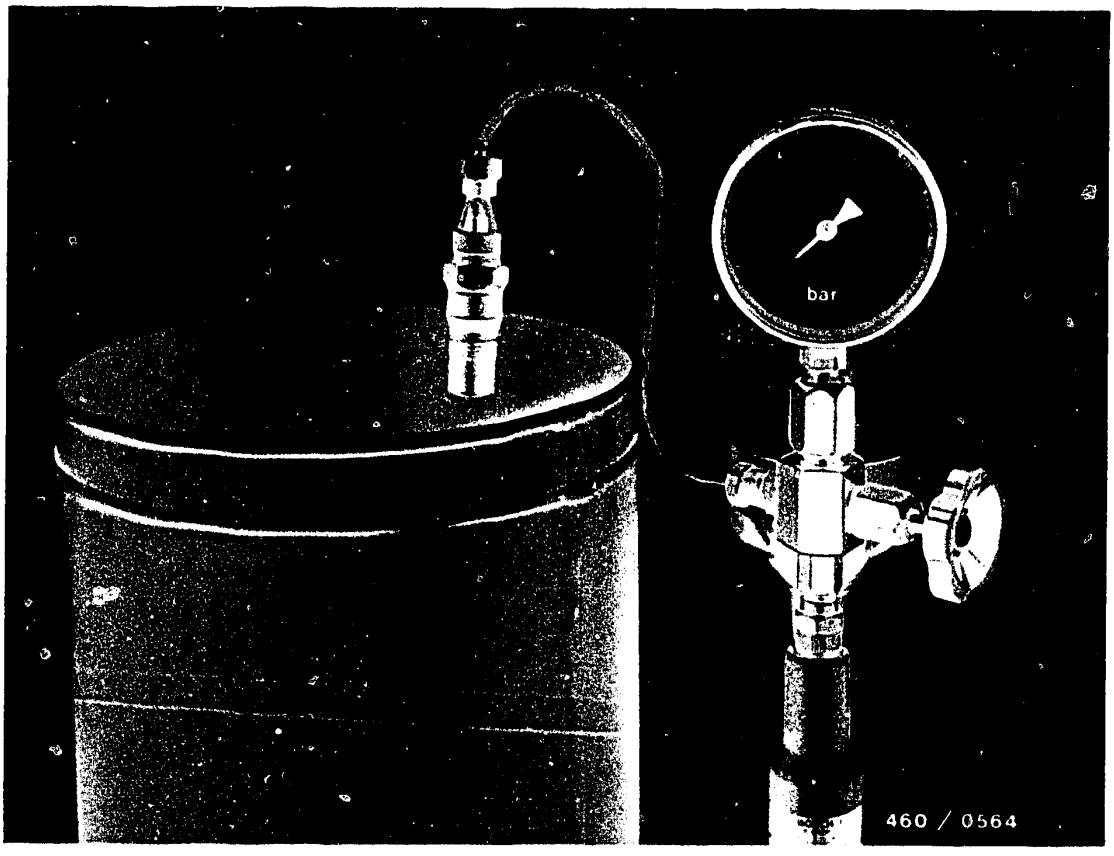


17.4 Adjust idle increase (with LFG)

Bring idle-adjusting lever (4) up against adjusting screw (3) for increased idle.

Set engine speed for increased idle to 950 + 50 min^{-1}.

After adjusting, lock adjusting screw and seal.



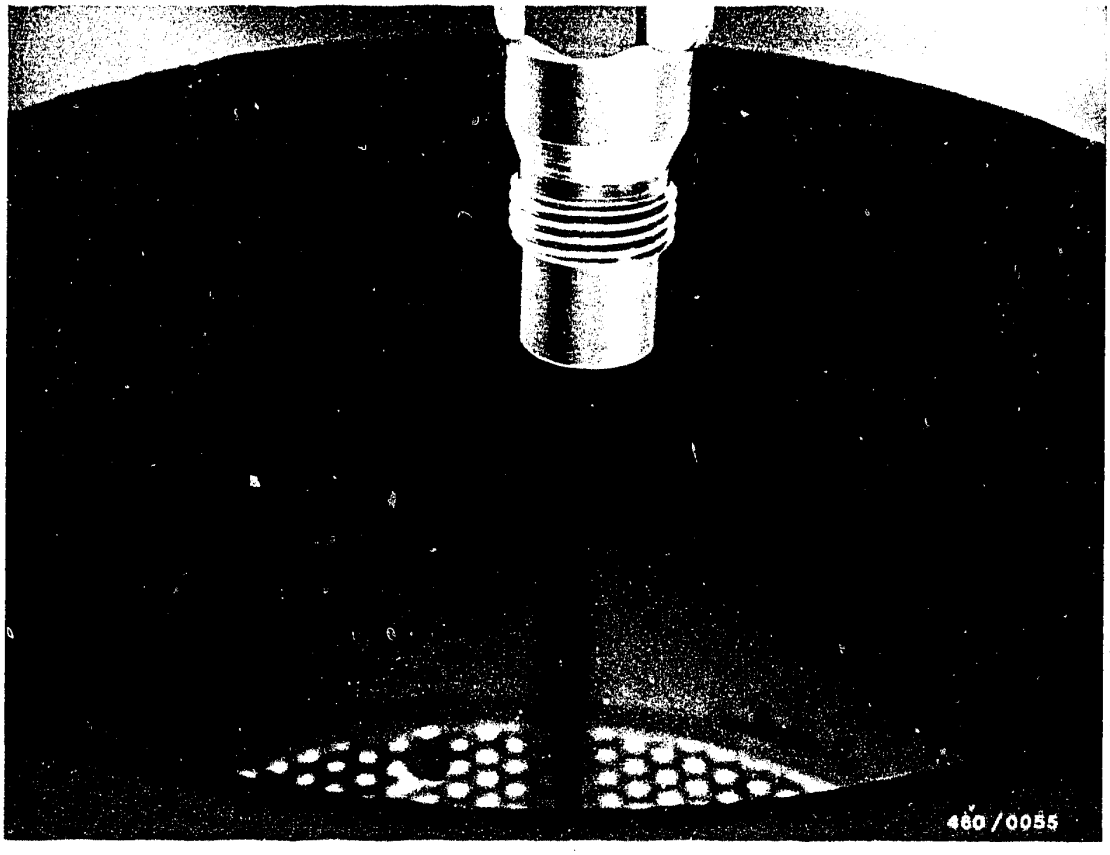
18. Test injection nozzles

Remove injection nozzles.

The test is performed using the nozzle tester EFEP 60 H 0 681 200 502.

Mount injection nozzle with nozzle-holder assembly on nozzle tester.

Caution:
When testing injection nozzles, make sure that the fuel spray does not strike your hands since, due to the high pressure, the fuel will penetrate into the skin and may cause blood poisoning.



18.1 Spray test

Switch off pressure gauge.

The spray pattern cannot be assessed until when the lever is being operated quickly (approx. 4-6 strokes per second). The spray must be quite concentrated and break off cleanly.

18.2 Chatter test

The pressure gauge is switched off.
Fully depress the lever of the tester slowly (1-2 strokes per second).
Nozzles in good working order must chatter when fuel escapes.

18.3 Check injection pressure

Switch on pressure gauge.
Slowly force lever downwards. When nozzle begins to squirt, read off injection pressure.
In the case of deviations from the nominal value, the nozzle-opening pressure must be adjusted by shims behind the pressure spring in the nozzle-holder assembly.

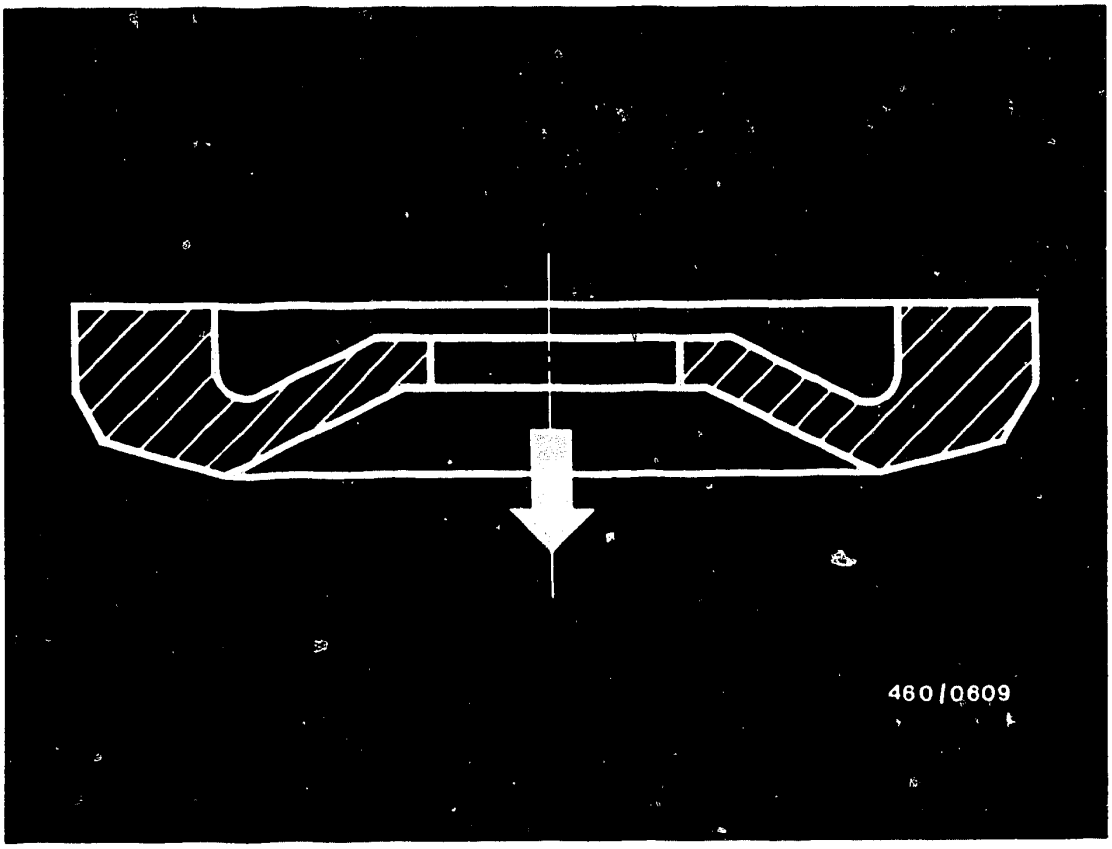
Nominal value: 130+5 bar

Thicker shims = higher nozzle-opening pressure
Thinner shims = lower nozzle-opening pressure

Increasing the spring travel by 0.05 mm causes a 5.0 bar increase in the nozzle-opening pressure.

18.4 Leak test

Pressure gauge switched on.
Slowly force lever downwards and maintain pressure about 20 bar below opening pressure for 10 seconds. The nozzle must not drip during this period.

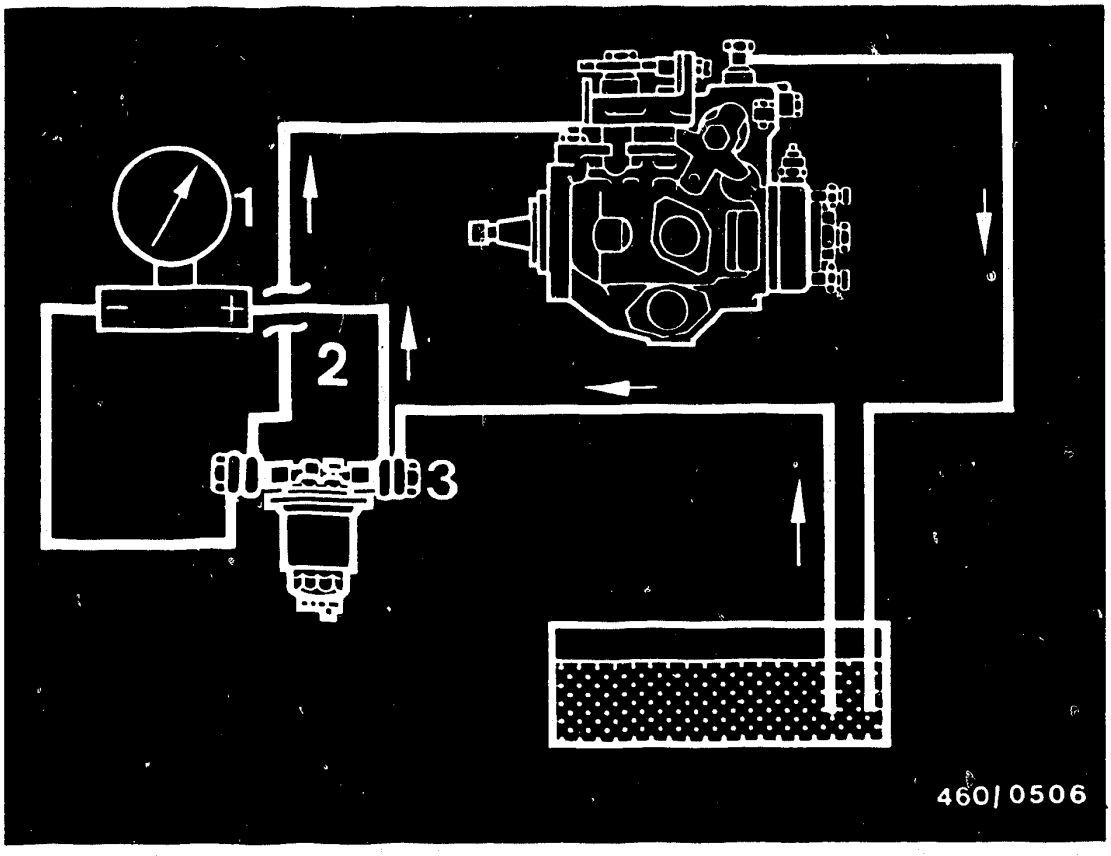


18.5 Install injection nozzles

Before installing the injection nozzles, fit a new heat seal in the direction of the arrow with respect to the cylinder head (Picture).

Tighten the fastening screws of the nozzle-holder assembly to 90 Nm.

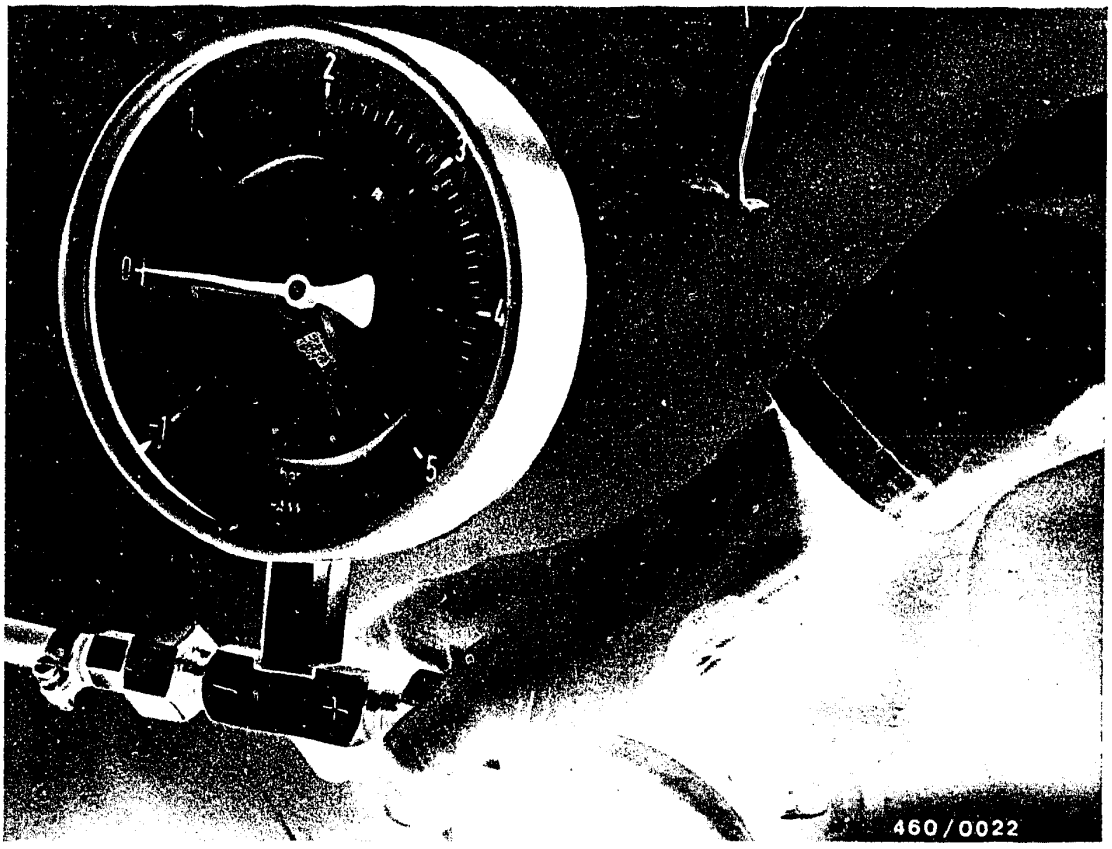
Tighten the union nuts of the fuel-injection tubing to 25 Nm.



1 = Differential-pressure gauge
2 = Filter outlet (use inlet union and extra-long inlet-union screw 2 443 456 020).
3 = Filter inlet (use inlet union and extra-long inlet-union screw 2 443 456 020).

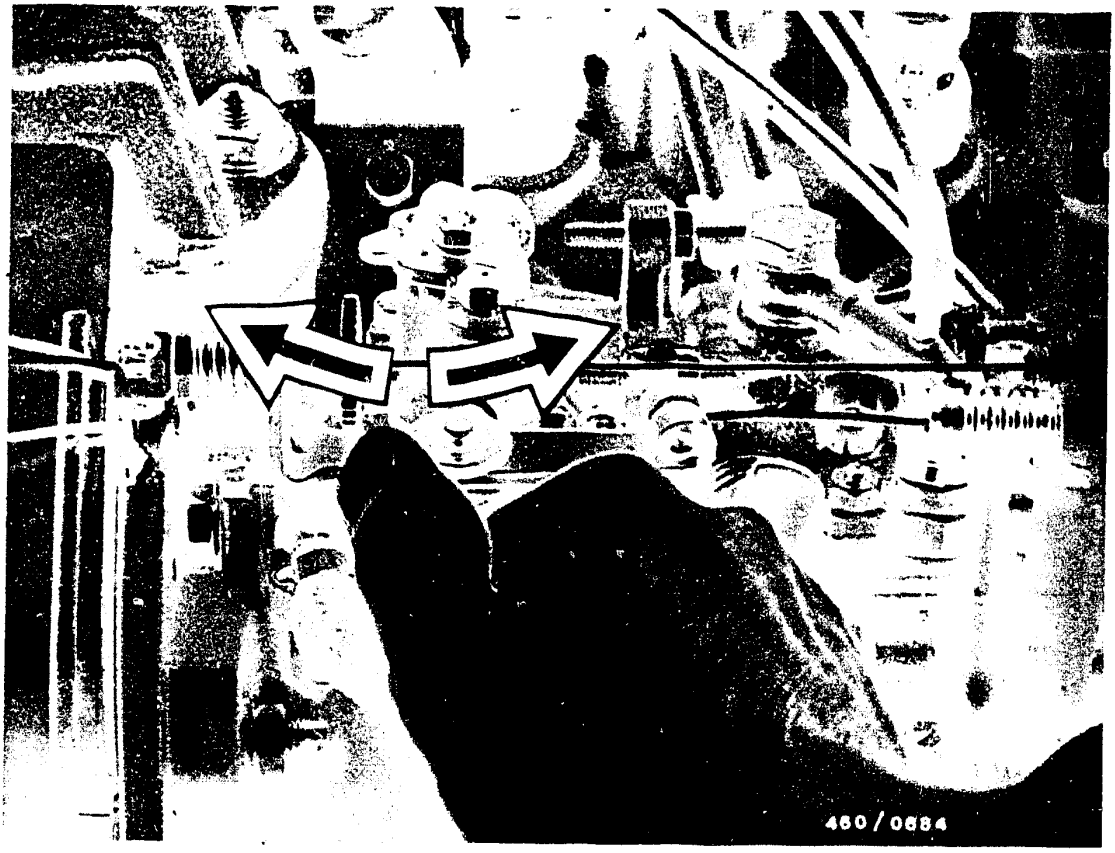
19. Check fuel filter

Connect differential-pressure gauge to fuel filter using appropriate connecting pieces.



Connect the (+) side of the differential-pressure gauge to the fuel filter inlet. Fit the (-) connection of the pressure gauge to the filter outlet. See connection diagram.

Run engine until you are sure that there is no air in the fuel system.



Move injection-pump control lever briskly (approx 1 second) from the idle stop to the maximum-speed stop.

Release control lever and read off differential pressure on pressure gauge.

The differential pressure may be max. 0.3 bar.
If this value is exceeded, replace filter. Remove test connections.

If necessary, bleed fuel system.

20. Test preheating system

20.1 Necessary test equipment

VA tester	e.g. ETT 011.00	0 684 101 100

20.2 Workshop information

20.3 We recommend that the R-type sheathed-element glow plug be replaced every 45000 km.

Note:
Incorrect setting of the start of delivery can considerably shorten the life of the sheathed-element glow plugs.

20.4 For each repeat start it is necessary - to obtain renewed preheating - to turn the glow-plug and starter switch first of all to position St and then to position M.
This makes it possible for the safety cutoff installed in the glow-duration unit to be reactivated.

20.5 If there is a voltage above 16 V across terminal 3 of the glow-duration unit (e.g. during fast charging), the glow-duration unit will not switch on. If the increased voltage occurs during preheating, the glow-duration unit switches off immediately. (Overvoltage protection for R-type sheathed-element glow plugs).

20.6 In the event of a short circuit (short-circuit current as of approx. 240 A) in the power circuit term. 1 and at term. 5 of the glow-duration unit including R-type sheathed-element glow plug, the glow-duration unit switches off.

20.7 Preheating time

The on-time of the preheating system is dependent on the ambient temperature.

Note:

To prevent the glow-duration unit from being irreparably damaged, a 12 V, max. 2 W bulb must be installed in the start repeater lamp.

Conditions for testing:

Battery fully charged.
Compression O.K., if necessary test compression loss.
Fuel supply/injection system O.K.

Starting motor operates, engine fails to start or starts only with great difficulty

yes

Test power supply to R-type sheathed-element glow plugs.
Connect voltmeter to R-type sheathed-element glow plug and to ground. Turn glow-plug and starter switch to position St and then to position M. For at least 11 seconds (dependent on temperature) a minimum voltage of 10 V must be indicated. After this time the system switches off automatically.
Caution;
If the measurement has to be repeated, first of all turn glow-plug and starter switch to position St and then to position M.

Minimum voltage present?

no →

1. If voltage below 10 V, test power circuit (battery +) as well as term. 1 and term. 5 of glow-duration unit for voltage drop.
   Eliminate voltage drop.
2. If no voltage, test lead from R-type sheathed-element glow plug to glow-duration unit term. 5 for open circuit.
   Eliminate open circuit.
   If no open circuit, continue on Coordinate D7/D8
   Continuation from here not necessary.

yes

Test start repeater lamp.

Turn glow-plug and starter switch to position St and then to position M.
Start repeater lamp must light up.

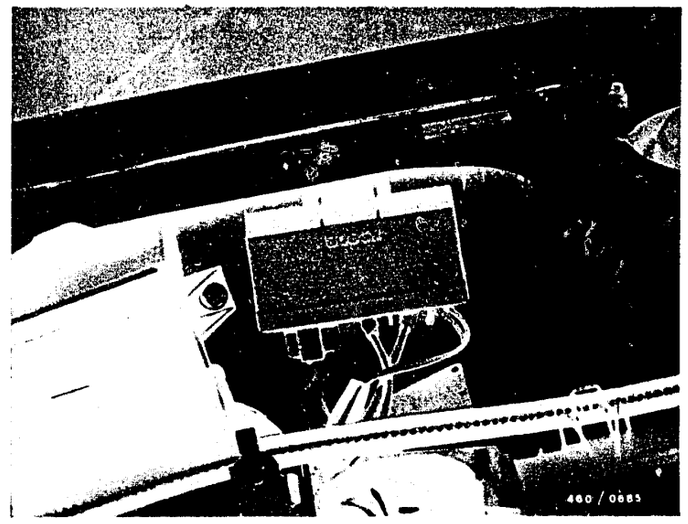
Start repeater lamp lit?

no →

1. Test lead from glow-plug and starter switch term. 15 to glow-duration unit term. 3 for open circuit. Eliminate open circuit.
2. Test lead from glow-duration unit term. 6 including start repeater lamp as well as its ground connections for open circuit. Eliminate open circuit.
3. Test ground lead term. 2 of glow-duration unit for open circuit.
   Eliminate open circuit.

yes

Continued on D3/D4



Installation position of glow-duration unit e.g. in Peugeot 305 D
(in engine compartment on right).

1 = Battery
2 = Glow-plug indicator lamp (12 V, 2 W)
3 = Glow-duration unit
4 = Solenoid-operated valve
5 = Starting motor
6 = Sheathed-element glow plugs

Test preheating system (continued)

yes

Test preheating time

Turn glow-plug and starter switch to position St and then to position M.
The preheating time (start repeater lamp lit) must be as follows for the following ambient temperatures:

	0° C	7... 11	Seconds
+	10° C	6... 10	Seconds
+	20° C	4... 8	Seconds
+	30° C	3... 6	Seconds
+	40° C	1... 5	Seconds.

Preheating time (seconds) O.K.?

no → Replace glow-duration unit.

yes

Test safety cutoff

Connect voltmeter to R-type sheathed-element glow plug and to ground. Turn glow-plug and starter switch to position St and then to position M. The voltmeter must indicate voltage for the following periods of time at the following ambient temperatures:

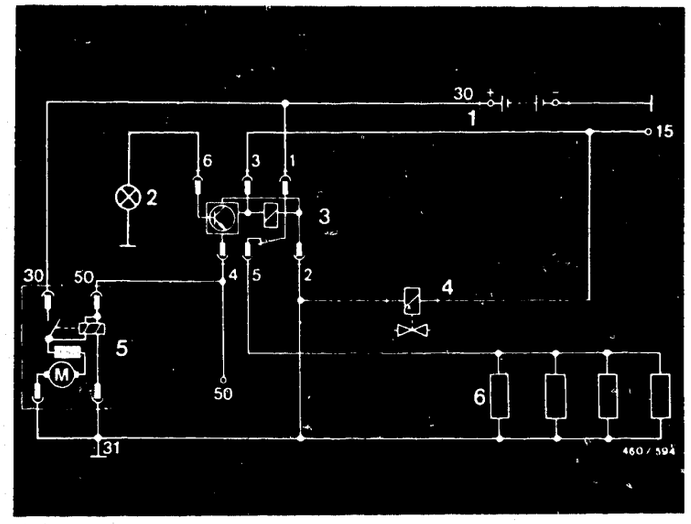
	0° C	16... 20	Seconds
+	10° C	15... 19	Seconds
+	20° C	14... 18	Seconds
+	30° C	13... 17	Seconds
+	40° C	12... 16	Seconds.

After the specified time the voltmeter must indicate 0 V.
Voltmeter at 0 V after the specified time?

no → Replace glow-duration unit

yes

Continued on D5/D6



1 = Battery
2 = Glow-plug indicator lamp (12 V, 2 W)
3 = Glow-duration unit
4 = Solenoid-operated valve
5 = Starting motor
6 = Sheathed-element glow plugs

Test preheating system (continued)

yes

Test preheating when operating starting motor.

Connect voltmeter to R-type sheathed-element glow plug and to ground. Turn glow-plug and starter switch to position D.
Voltmeter must indicate a voltage of 6 ... 10 V.

Voltage present?

no →

1. Test lead from glow-plug and starter switch for open circuit. Eliminate open circuit.

2. If point 1 O.K., replace glow-duration unit.

yes

Test R-type sheathed-element glow plugs

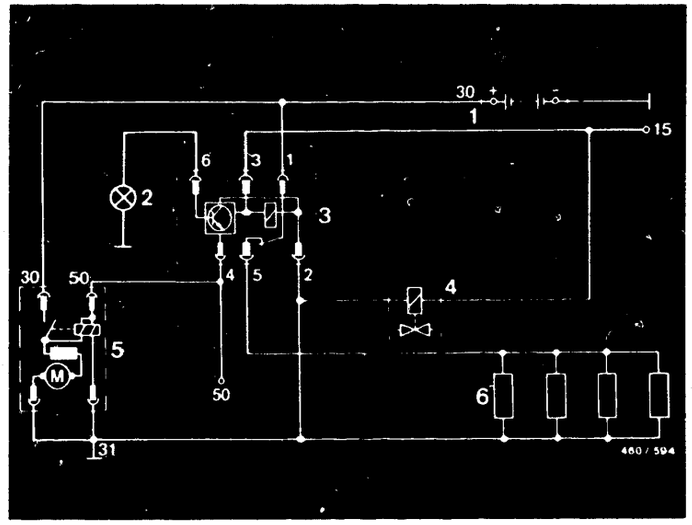
Test R-type sheathed-element glow plugs individually for continuity using ohmmeter.

O.K.?

no → Replace R-type sheathed-element glow plug

yes

Preheating system O.K.
Tests as of D1 not necessary.



1 = Battery
2 = Glow-plug indicator lamp (12 V, 2 W)
3 = Glow-duration unit
4 = Solenoid-operated valve
5 = Starting motor
6 = Sheathed-element glow plugs

Test preheating system (continued from D1/D2).

Test voltage at glow-duration unit term. 3.

Connect voltmeter to glow-duration unit term. 3 and to ground.
Turn glow-plug and starter switch to position St and then to position M.
Voltmeter must indicate battery voltage.
Battery voltage present?

no → Test lead from glow-duration unit term. 3 to glow-plug and starter switch for open circuit.
Eliminate open circuit.

yes ↓

Test ground lead term. 2 of glow-duration unit.
Connect voltmeter to glow-duration unit term. 2 and battery +.
Voltmeter must indicate battery voltage.
Battery voltage present?

no → Test ground lead term. 2 of glow-duration unit for open circuit.
Eliminate open circuit.

yes ↓

Test voltage at glow-duration unit term. 1.

Connect voltmeter to glow-duration unit term. 1 and to ground.
Voltmeter must indicate battery voltage.
Battery voltage present?

no → Test lead from glow-duration unit term. 1 to battery + for open circuit.
Eliminate open circuit.

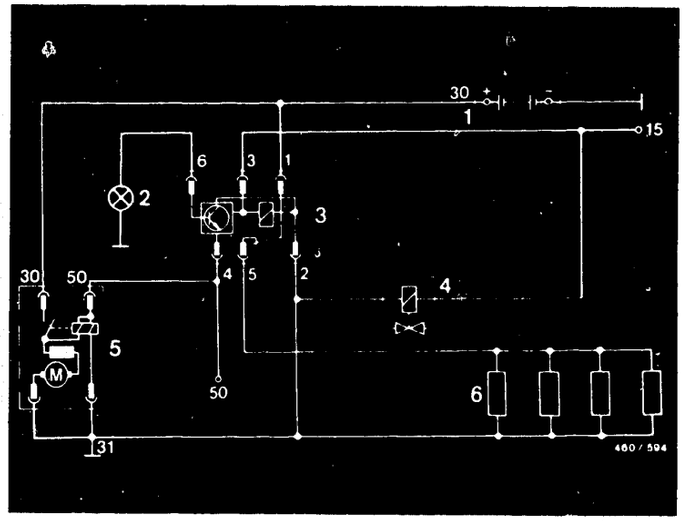
yes ↓

Voltage now present at R-type sheathed-element glow plug?

no → Replace glow-duration unit.

yes ↓

Continued on D9/D10



1 = Battery
2 = Glow-plug indicator lamp (12 V, 2 W)
3 = Glow-duration unit
4 = Solenoid-operated valve
5 = Starting motor
6 = Sheathed-element glow plugs

Test preheating system (continued)

yes

Test start repeater lamp.

Turn glow-plug and starter switch to position St and then to position M.
Start repeater lamp must light up.

Start repeater lamp lit?

no

1. Test lead from glow-plug and starter switch term. 15 to glow-duration unit term. 3 for open circuit. Eliminate open circuit.
2. Test lead from glow-duration unit term. 6 including start repeater lamp as well as its ground connections for open circuit. Eliminate open circuit.
3. Test ground lead term. 2 of glow-duration unit for open circuit. Eliminate open circuit.

yes

Test preheating time

Turn glow-plug and starter switch to position St and then to position M.
The preheating time (start repeater lamp lit) must be as follows for the following ambient temperatures:

	0° C -	7... 11	Seconds
+	10° C -	6... 10	Seconds
+	20° C -	4... 8	Seconds
+	30° C -	3... 6	Seconds
+	40° C -	1... 5	Seconds

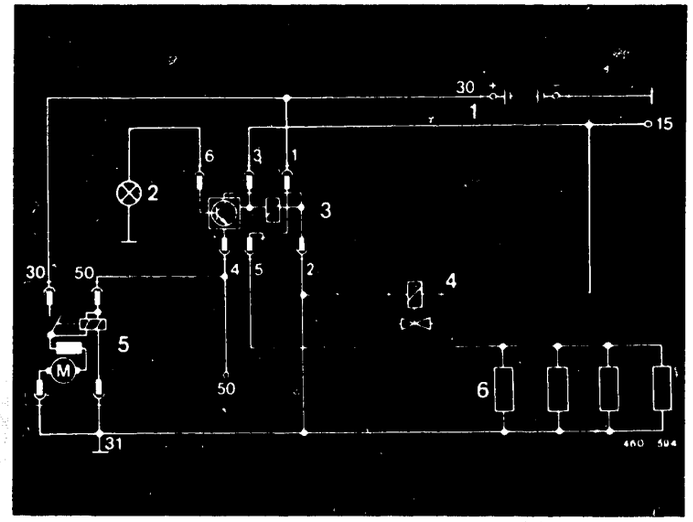
Preheating time (seconds) O.K.?

no

Replace glow-duration unit.

yes

Continued on D11/D12



1 = Battery
2 = Glow-plug indicator lamp (12 V, 2 W)
3 = Glow-duration unit
4 = Solenoid-operated valve
5 = Starting motor
6 = Sheathed-element glow plugs

Test preheating system (Continued)

yes

Test safety cutoff
Connect voltmeter to R-type sheathed-element glow plug and to ground. Turn glow-plug and starter switch to position St and then to position M. The voltmeter must indicate voltage for the following periods of time at the following ambient temperatures:

0° C - 16... 20 Seconds
\+ 10° C - 15... 19 Seconds
\+ 20° C - 14... 18 Seconds
\+ 30° C - 13... 17 Seconds
\+ 40° C - 12... 16 Seconds

After the specified time the voltmeter must indicate 0 V.
Voltmeter at 0 V after the specified time?

no → Replace glow-duration unit

yes

Test preheating when operating starting motor.
Connect voltmeter to R-type sheathed-element glow plug and to ground. Turn glow-plug and starter switch to position D.
Voltmeter must indicate a voltage of 6 ... 10 V.

Voltage present?

no →
1. Test lead from glow-plug and starter switch term. 50 for open circuit.
   Eliminate open circuit.
2. If point 1 O.K., replace glow-duration unit.

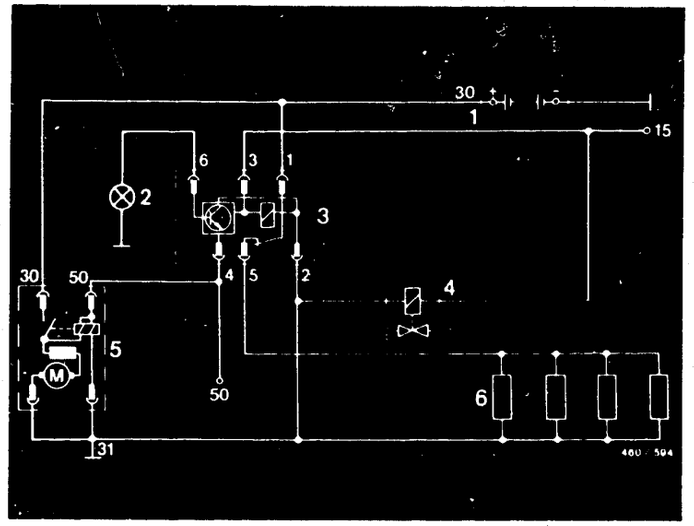
yes

Test R-type sheathed-element glow plugs.
Test R-type sheathed-element glow plugs individually for continuity using ohmmeter.
O.K.?

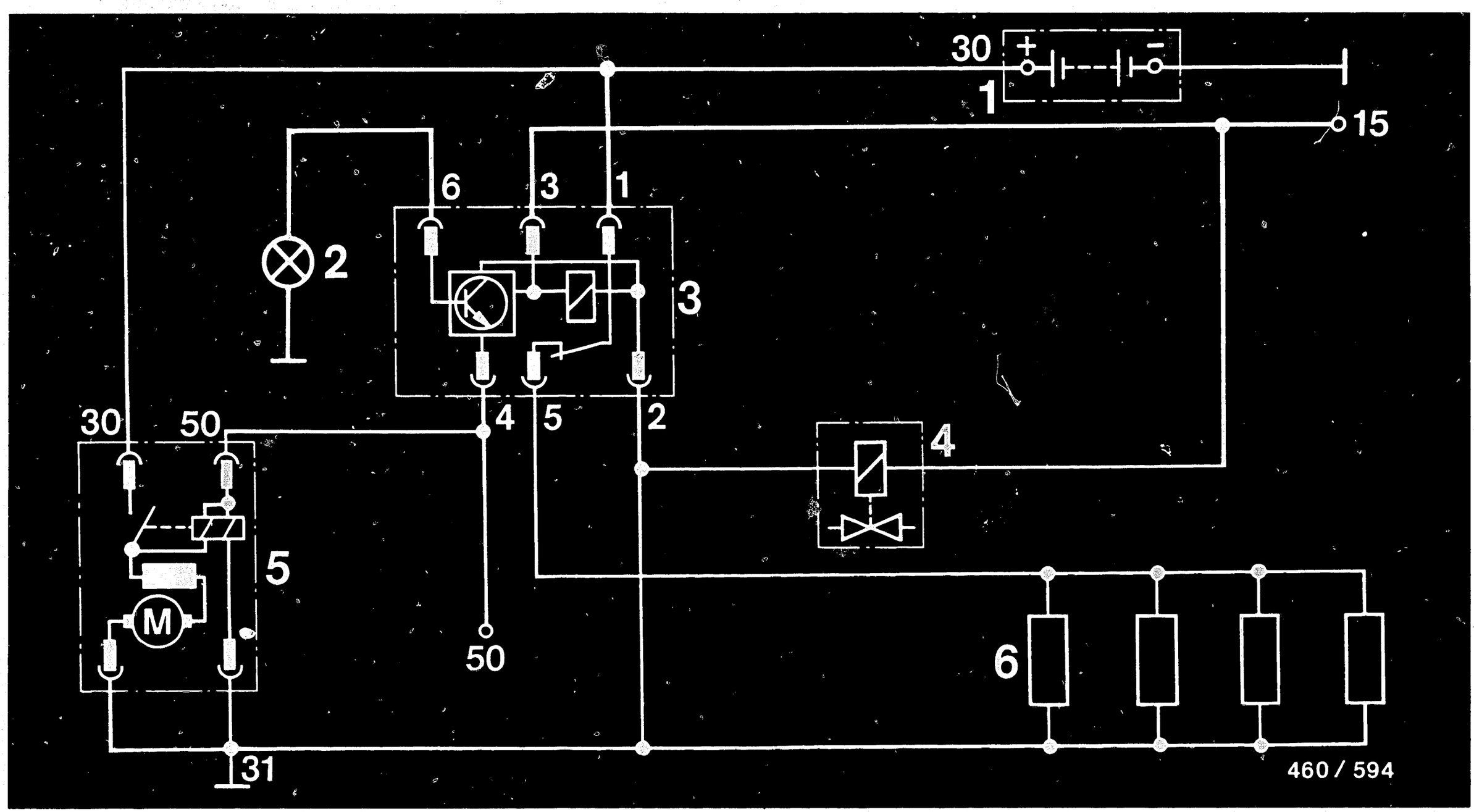
no → Replace R-type sheathed-element glow plug.

yes

Preheating system O.K.

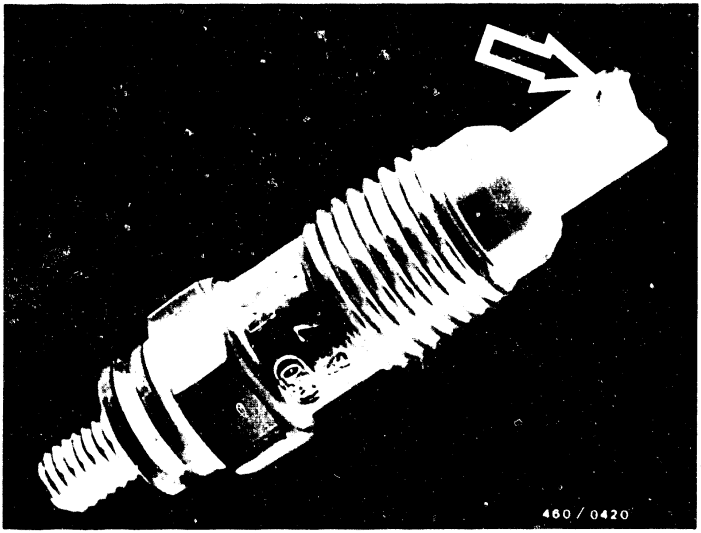


1 = Battery
2 = Glow-plug indicator lamp (12 V, 2 W)
3 = Glow-duration unit
4 = Solenoid-operated valve
5 = Starting motor
6 = Sheathed-element glow plugs



1 = Battery
2 = Glow-plug indicator lamp (12 V, max. 2 W)
3 = Glow-duration unit
4 = Solenoid-operated valve
5 = Starting motor
6 = Sheathed-element glow plugs

Terminal diagram for preheating system



Note:

Glow plugs with burned elements

Glow plugs with burned elements are frequently the result of troubles with the injection nozzle.

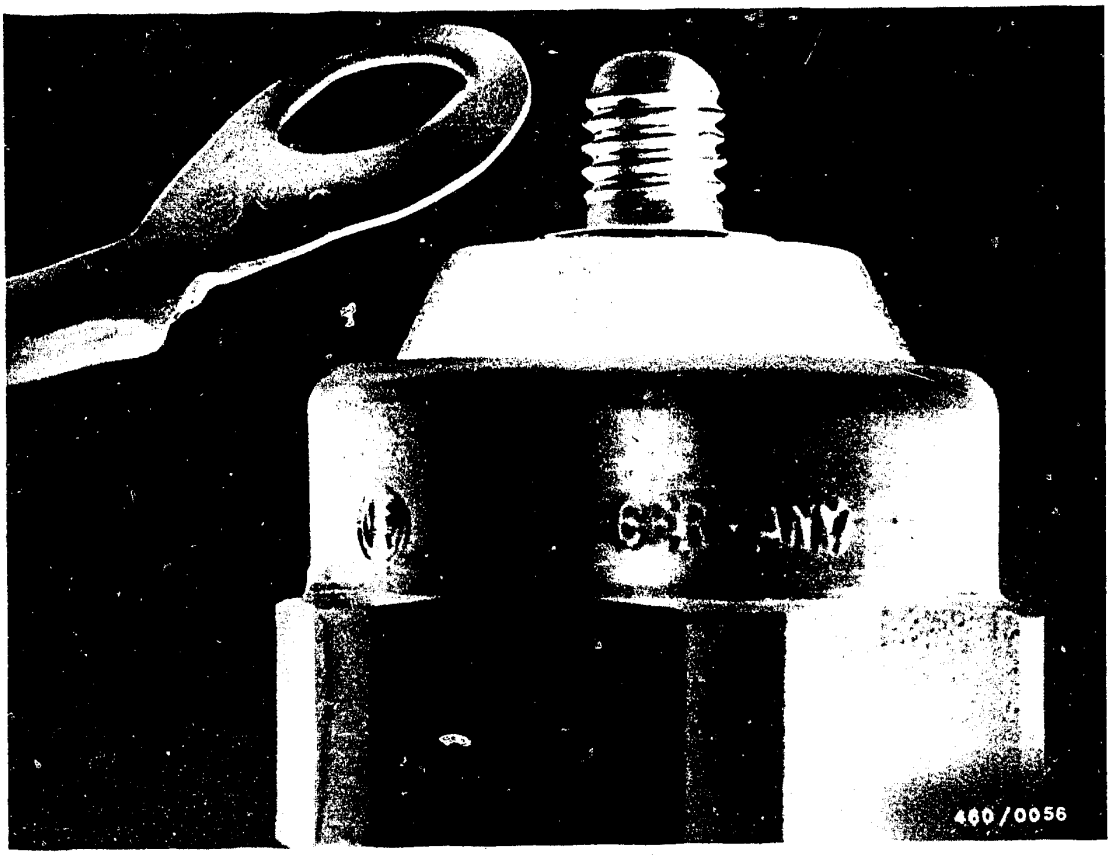
If glow plugs are found to have burned elements (arrow), it is not sufficient simply to replace them. The injection nozzles must also be tested for spray pattern, chattering, pressure and leaks.

21. Check timing device

In distributor-type fuel-injection pumps VE..F.. the timing device is integral with the fuel-injection pump.

In order to test the timing device, it is necessary to remove the fuel-injection pump.

Perform the test on the injection-pump test bench.



22. Measure engine compression and compression loss

22.1 Measure engine compression

Fit new chart in compression tracer. Mount high-pressure hose on tracer. Switch off engine.
In order to prevent fuel from being injected, remove connecting cable from shutoff magnet on distributor-type fuel-injection pump (picture).

Unscrew sheathed-element glow plugs and use suitable connection nipple for compression tester.

Using the starting motor, turn over the engine several times so that loose deposits are removed from the compression space.

Screw in connecting nipple.

Fit high-pressure hose of compression tester onto connecting nipple.

During the following operation, note first compression stroke in particular.

Operate starting motor until there is no longer any detectable rise in pressure on the compression tracer.

Bleed compression tracer by pressing on bleeder valve.

The pointer returns to the starting position.

Move chart onto next position.

Fit connection nipple to the other cylinders and repeat measurement.

Compression pressure:	25 ... 30 bar
	min. 18 bar

Allowable difference between cylinders:
max. 5 bar.

22.2 Evaluation of chart

1. Normal pressure rise

If piston rings and valves are in good condition, the first compression stroke shows the highest pressure increase.
During the following compression strokes the compression builds up to the maximum pressure.

2. Gradual pressure rise

If, from the start, the compression increases only gradually on each piston stroke, this points to burnt valve seats or defective valve guides.

3. Low maximum pressure

If the maximum pressure obtained is too low on all cylinders, this points to defective pistons, piston rings or valves.
If the compression is too low on two neighbouring cylinders, this points to a leaky cylinder head gasket.

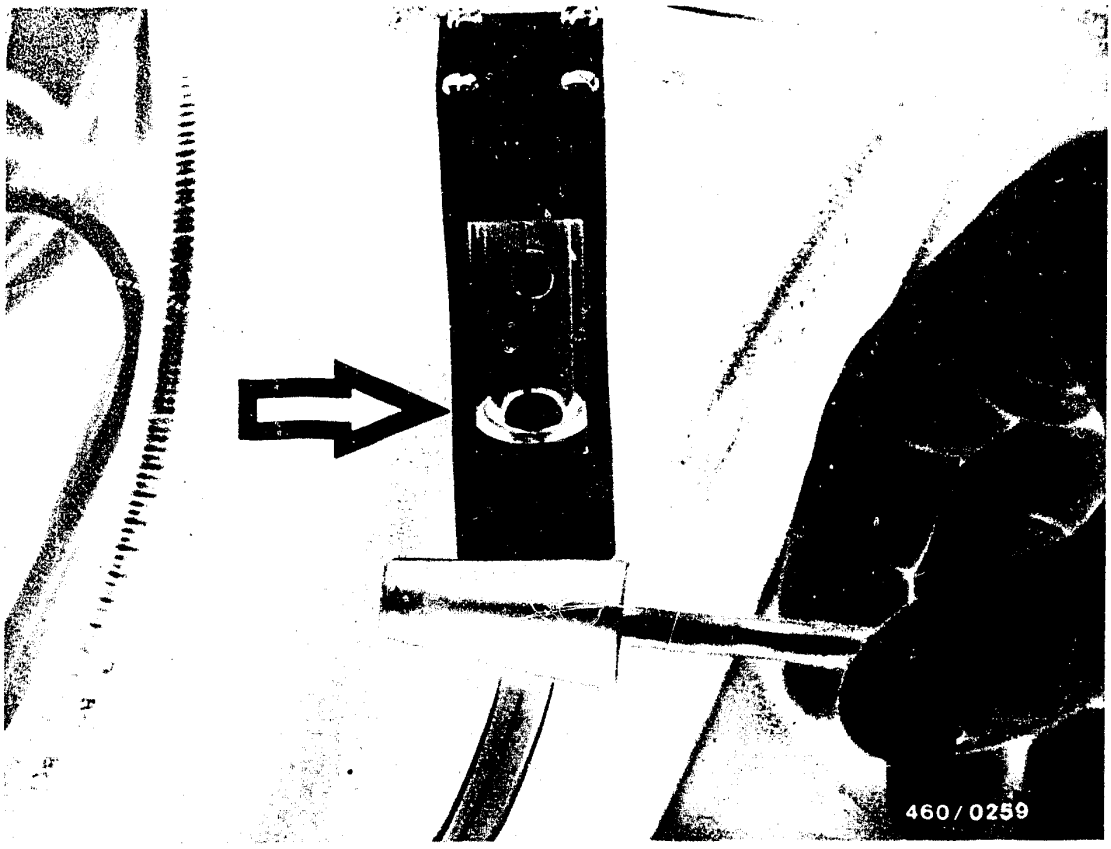
4. Varying compression

If one cylinder shows a clearly lower compression, proceed as follows: fill in 2-3 cm^3 of engine oil through the opening of the sheathed-element glow plug or nozzle-holder assembly and operate starting motor briefly.

Repeat measurements and compare charts. If there is a clear increase in compression during the second test, then the piston rings or cylinders are worn.
If there is no change in the result, then defective valves are the cause.

5. Uniform compression

Uniform compression is extremely important with regard to the smooth running of the engine. Maximum compression is, therefore, not the only objective.



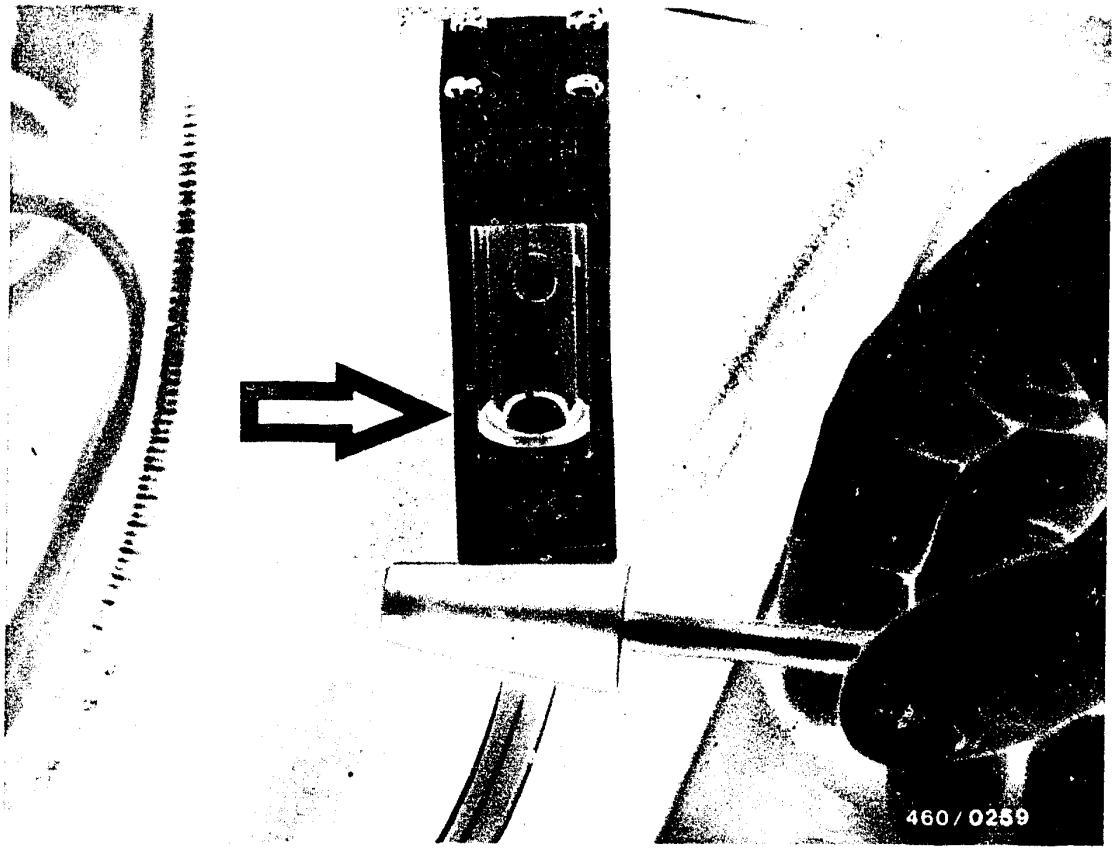
22.3 Measure compression loss of engine

The test is performed using the Bosch compression-loss tester 0 681 001 901 (EFAW 210 A).

For testing, the respective piston must be at TDC (TDC = top dead centre) on the compression stroke.

For setting this position, use DC detector 1 688 132 025 (included in accessories with compression-loss tester).

Perform test with engine at normal operating temperature (temperature of water approx. 80 °C).



22.4 Set top dead centre

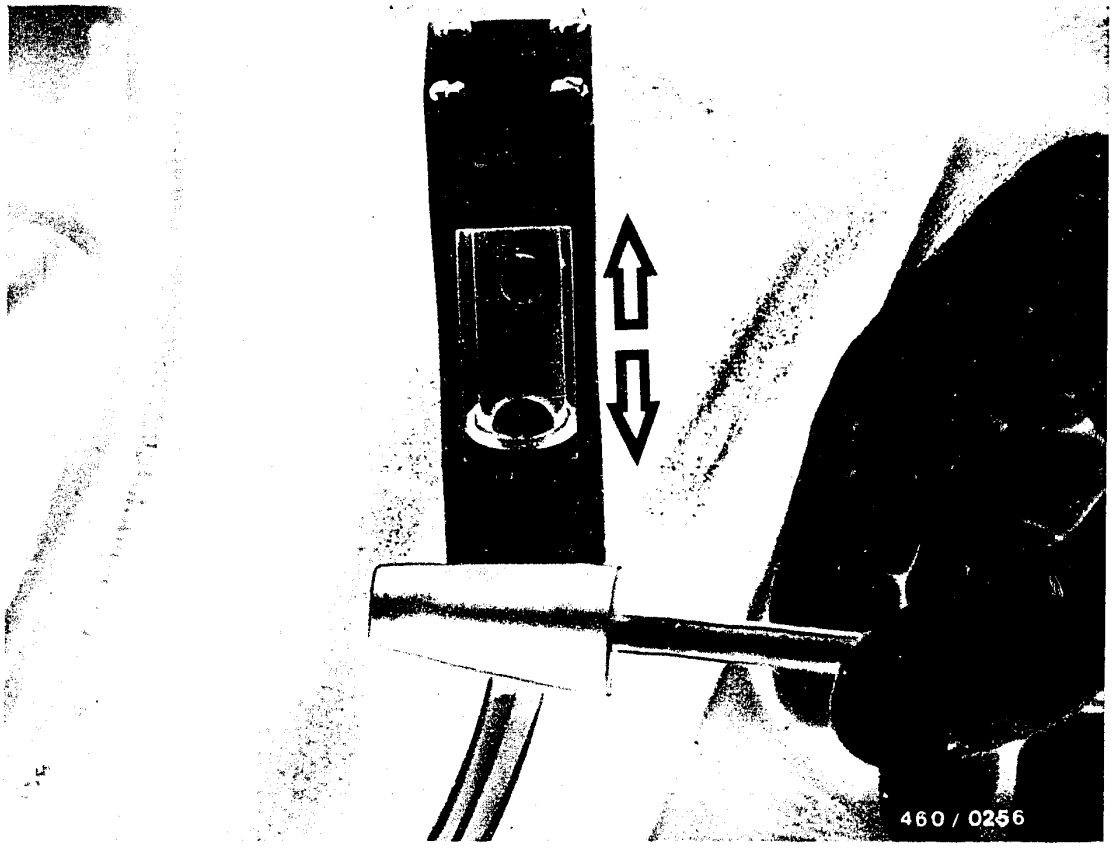
Remove sheathed-element glow plug from cylinder 1.

Insert rubber plug of DC detector into bore for sheathed-element glow plug.

Using magnetic clamp, mount glass cylinder in as vertical a position as possible in the engine compartment. The piston of the unit must be easily visible.

Slowly turn over crankshaft by hand in engine direction of rotation.

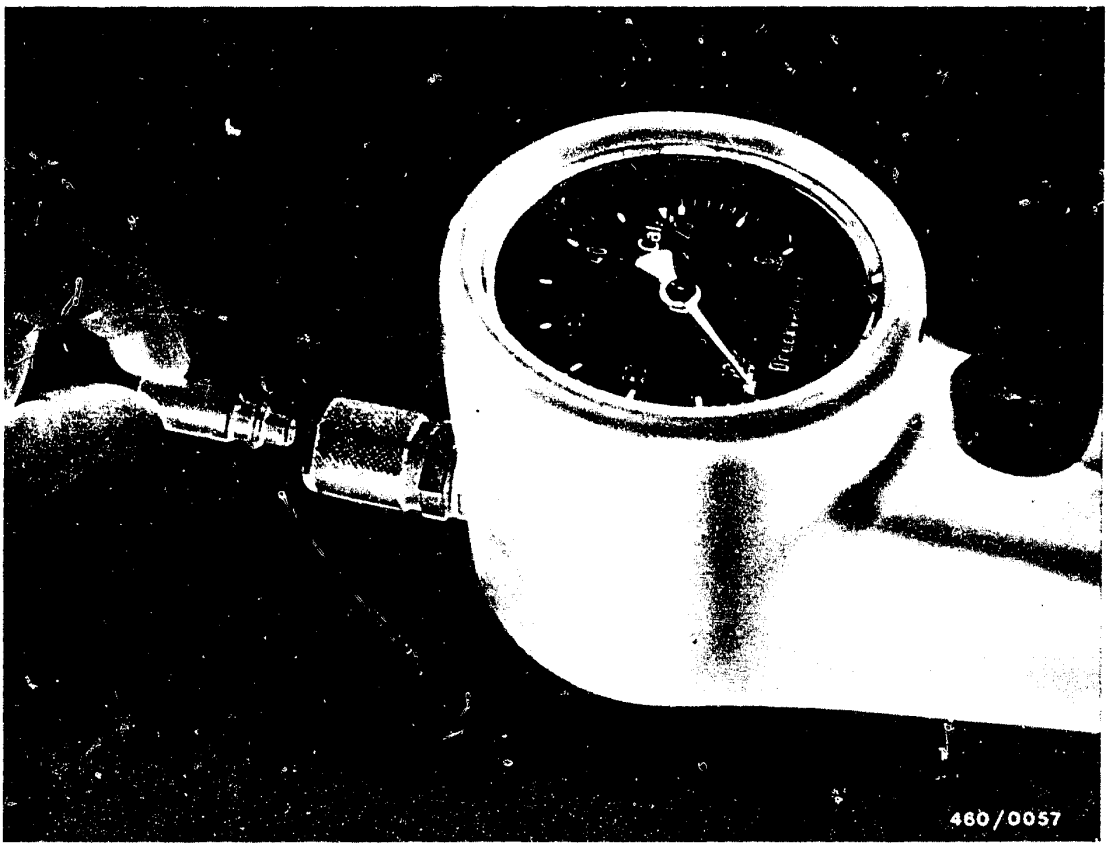
(If necessary, select gear and push vehicle.)



On the compression stroke, the piston on the DC detector is forced upwards.

As top dead centre is passed over, the piston slides down again immediately.

Find top dead centre by carefully turning the crankshaft backwards and forwards.

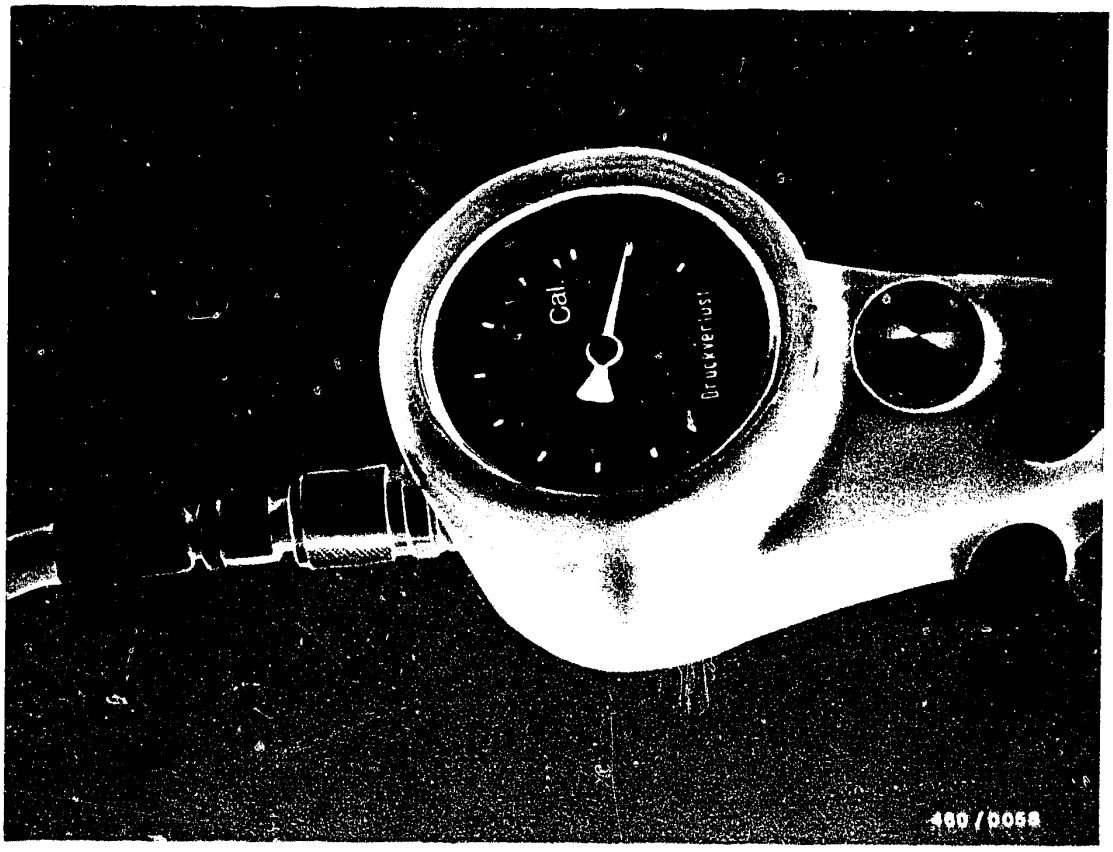


22.5 Measure compression loss

Connect tester to compressed-air mains.

Connect calibrating nozzle 1 680 363 036. Set a compression loss of 23 ± 1% (marking "Cal".) at the knurled thumbscrew on the pressure-regulating valve. Disconnect calibrating nozzle.

(Instrument indicator must show approximately 0% compression loss - equipment check.)



Screw in fitting and mount test hose.
Select gear and pull on handbrake.
Connect test hose to tester.
Read off compression loss in % on instrument.

Note:
Before testing the next cylinder, turn the engine over briefly without pre-heating using the starting motor so that the oil film re-forms.

22.6 Evaluation of test

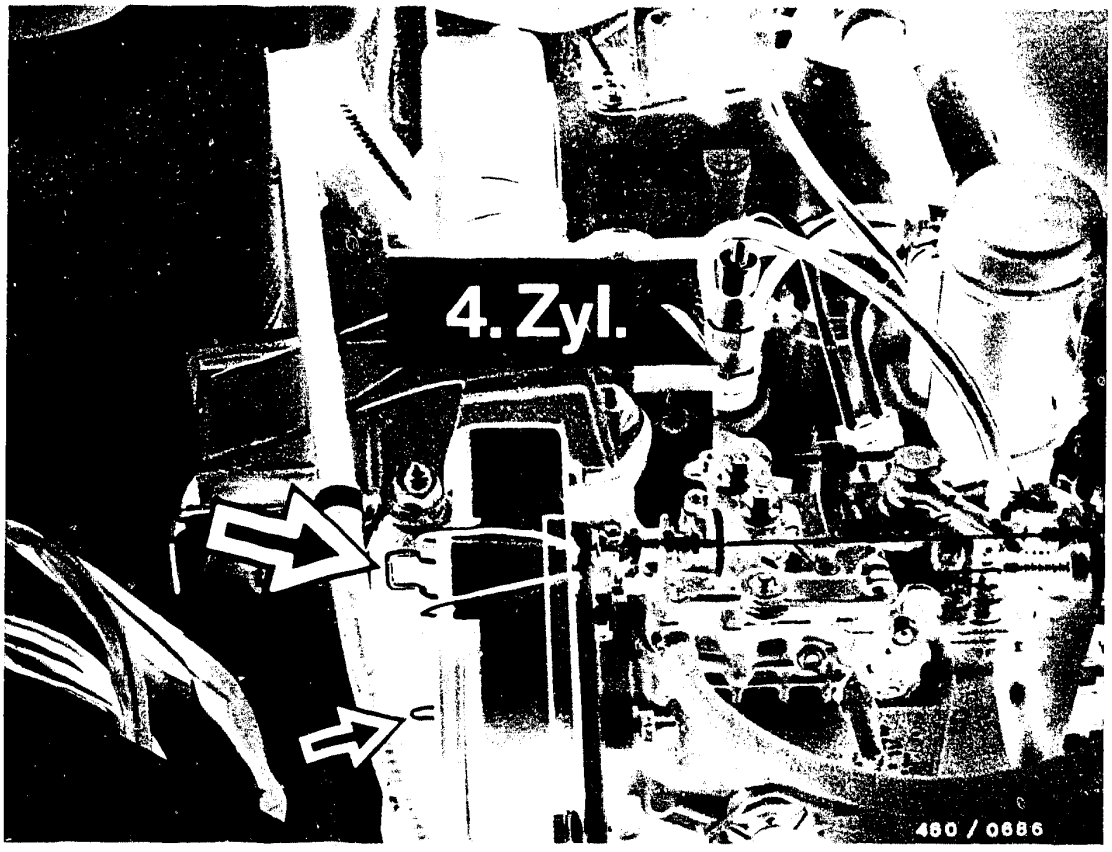
The compression loss indicated should not exceed 25%.

Differences of 10% between the individual cylinders can be ignored.
The causes of greater losses can be located because the air makes a noise as it escapes.
Listen at the following points:

Location of noise	Possible trouble
Intake manifold (remove air filter)	Intake valve
Exhaust manifold	Exhaust valve
Oil filler neck on engine	Pistons, piston rings
Cooling water filler neck (air bubbles)	Cylinder head gasket

In order to trace the trouble even more accurately, fill approximately 2-3 cm^3 of engine oil into the cylinder. Repeat test.
If there is a clear decrease in compression loss during this test, then the fault lies with the piston or with the piston rings.

New engines which have not yet been run in (less than 5,000 km) may show higher compression losses than after the running-in period.



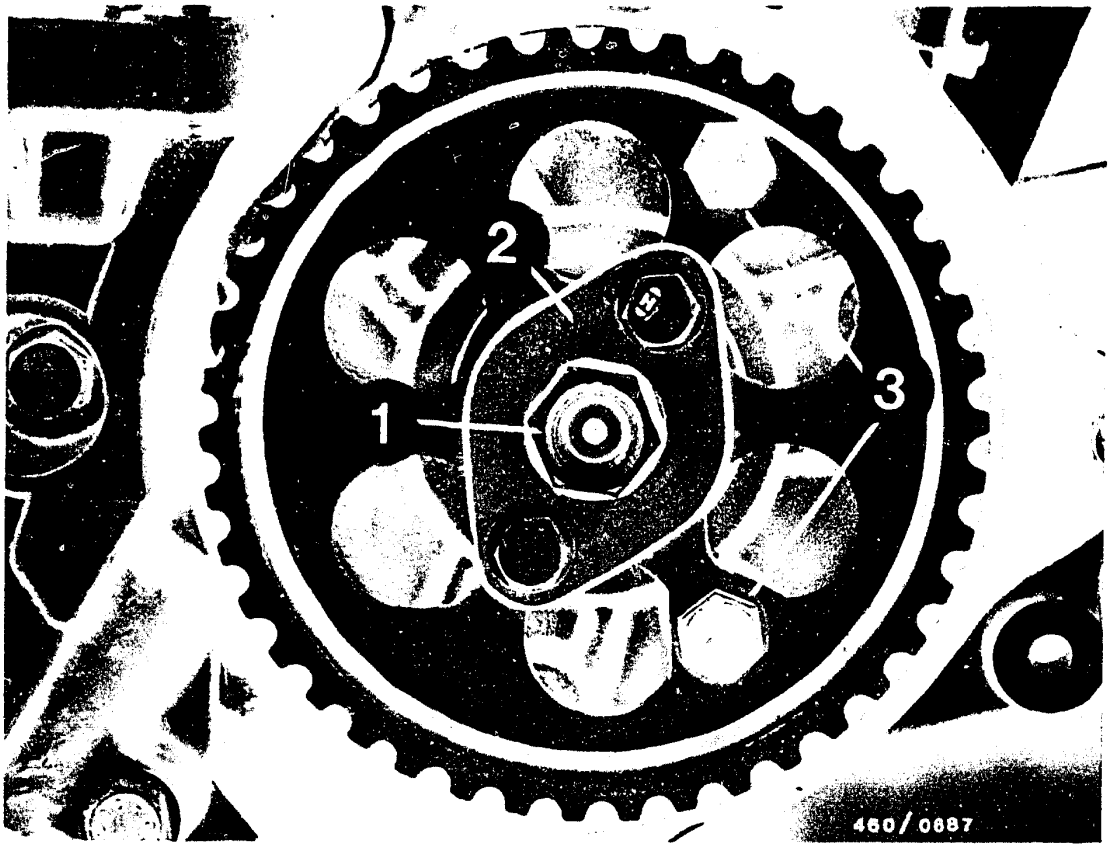
23. Remove fuel-injection pump

Disconnect negative cable from battery.

Remove toothed-belt protection cover (front half only); loosen holding clamps (arrows).

Remove cylinder head cover.

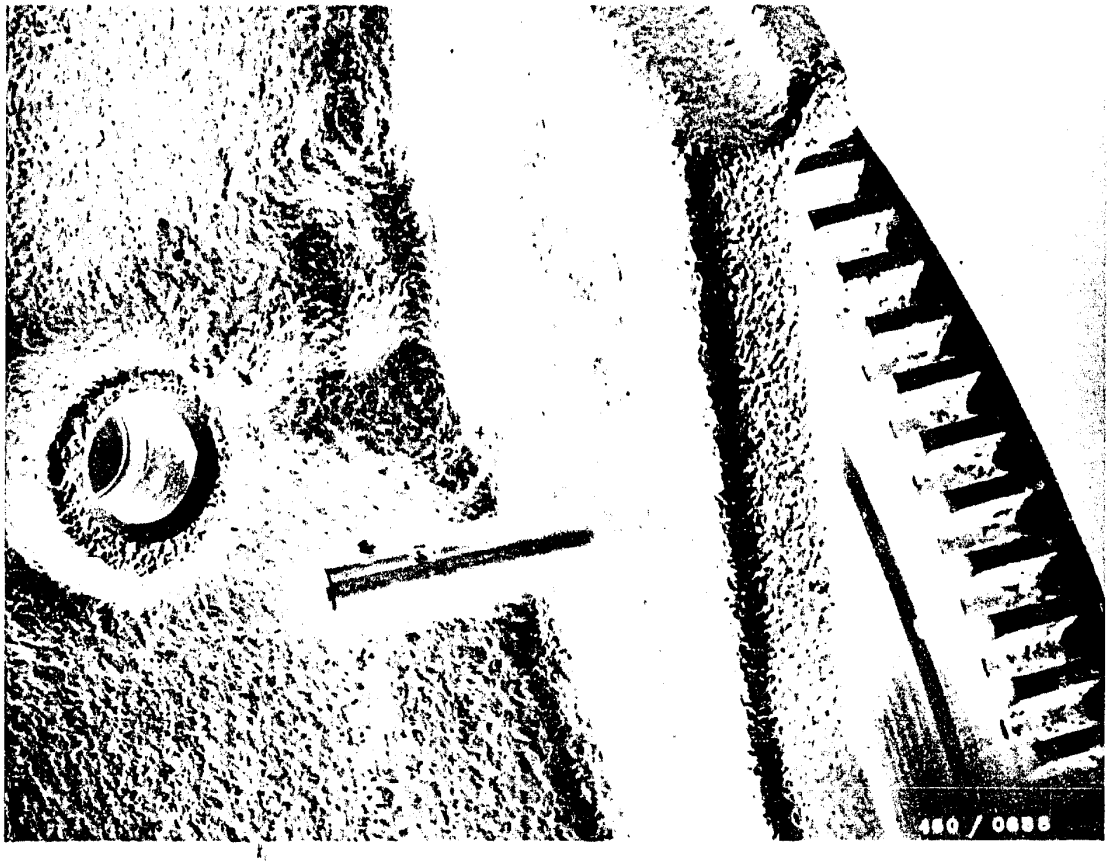
Turn crankshaft to TDC on cylinder 4 (cylinder 1 on valve overlap).



1 = Fastening nut
2 = Puller flange
3 = Locating screws

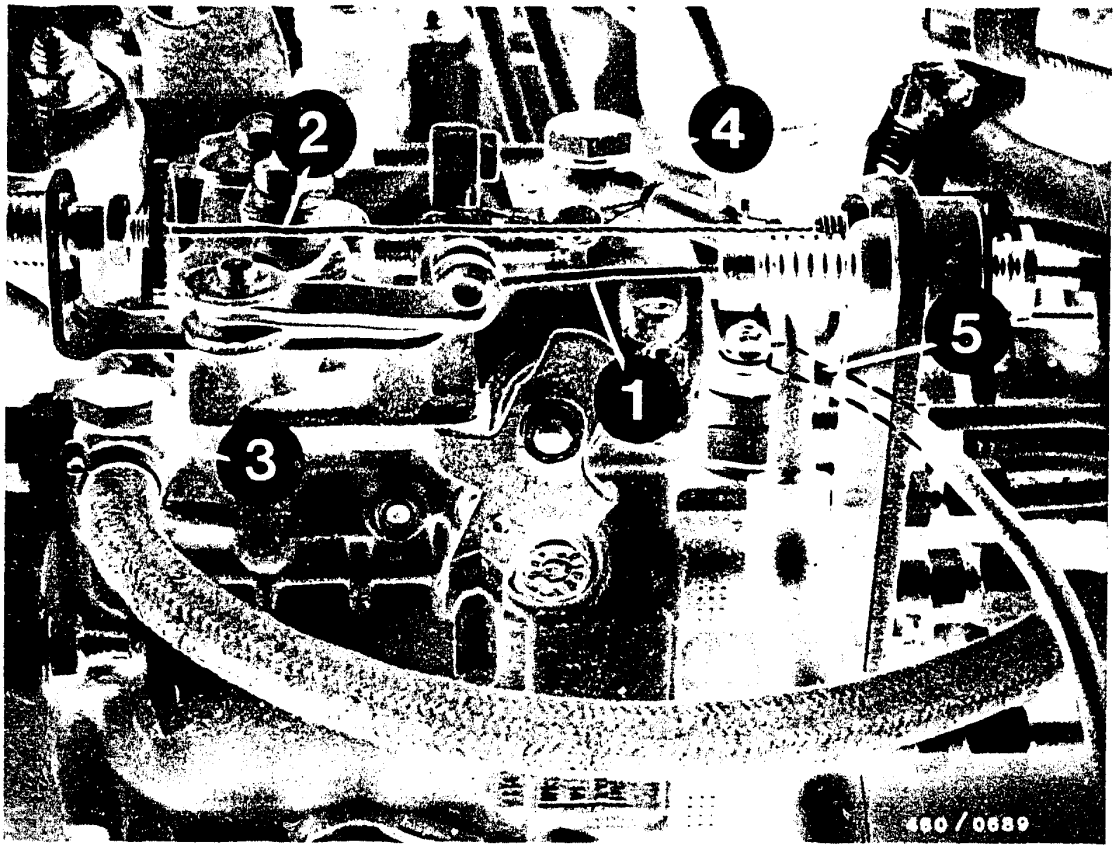
Locate injection-pump gear with two screws 8 x 30 mm (3).

Screw down by hand.



Lock flywheel with setting mandrel KDEP 1145.

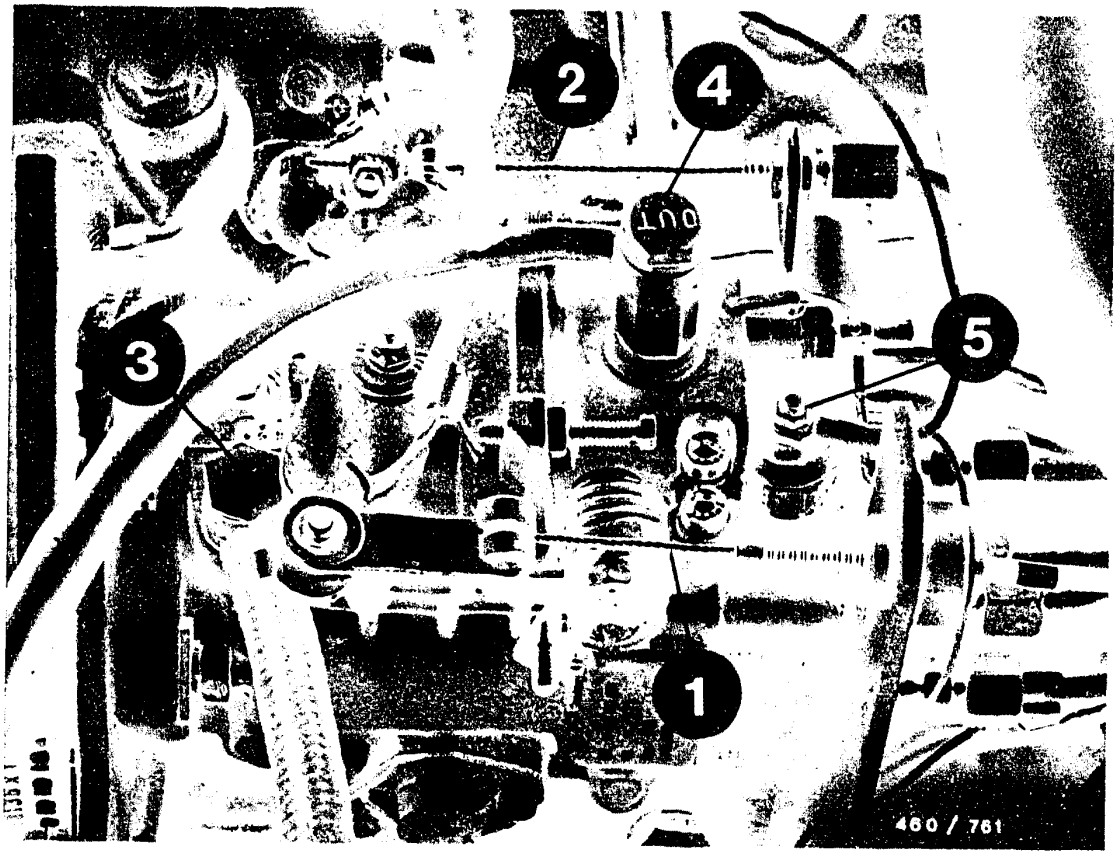
If the setting mandrel cannot be introduced, correct the engine timing.



Injection pump without housing-rigid idle spring (LFG)

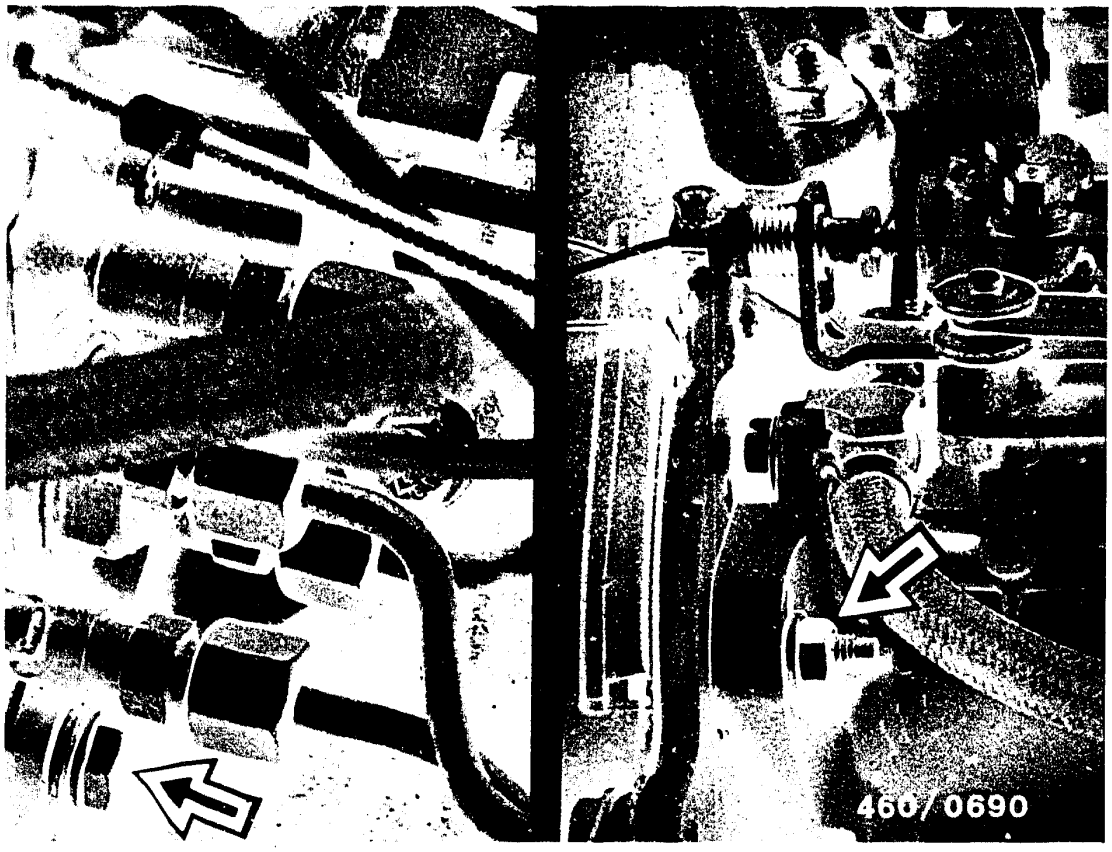
Remove injection-pump control-lever cable (1), cable for increased idle (2), fuel inlet line (3) and return line (4).

Remove cable for electrical shutoff device (5).



Fuel-injection pump with housing-rigid idle spring (LFG)

Remove cable from control lever of injection pump (1), cable for increased idle (2), fuel inlet line (3), return line (4) and cable for electrical shutoff device (5).

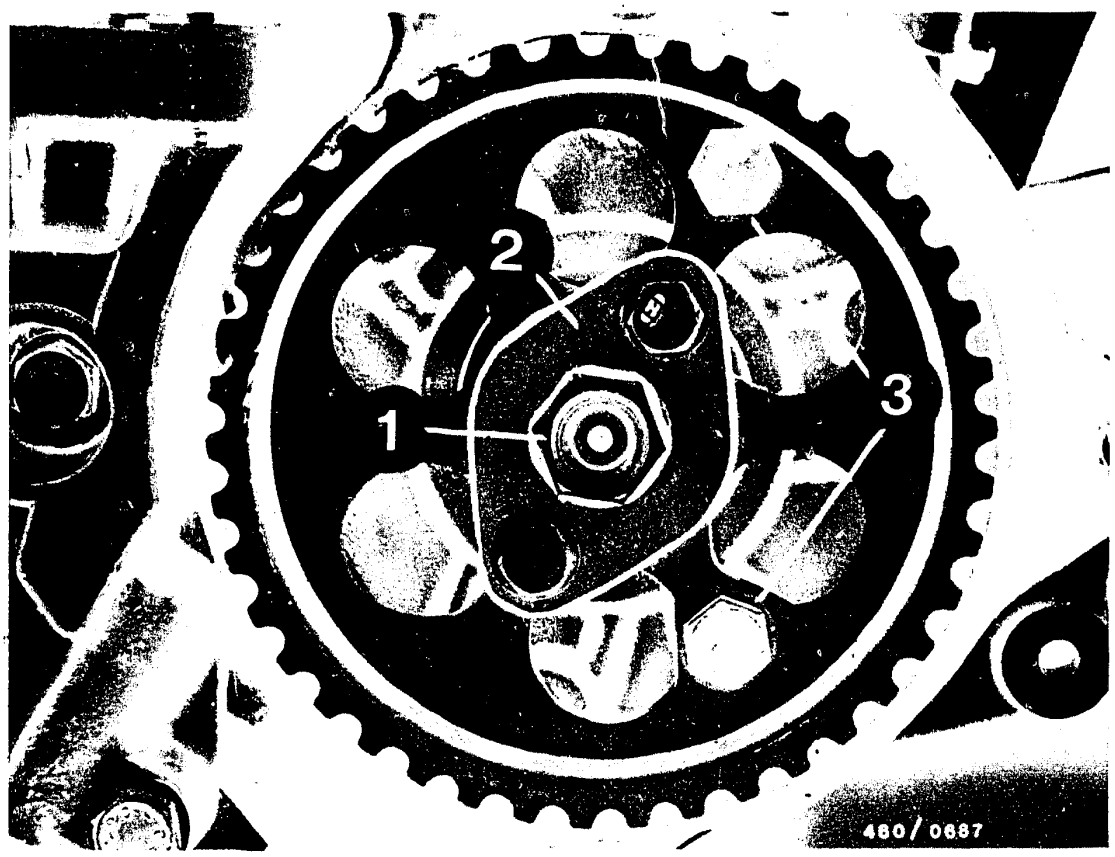


Loosen injection lines with box wrench KDEP 1115.

Note:

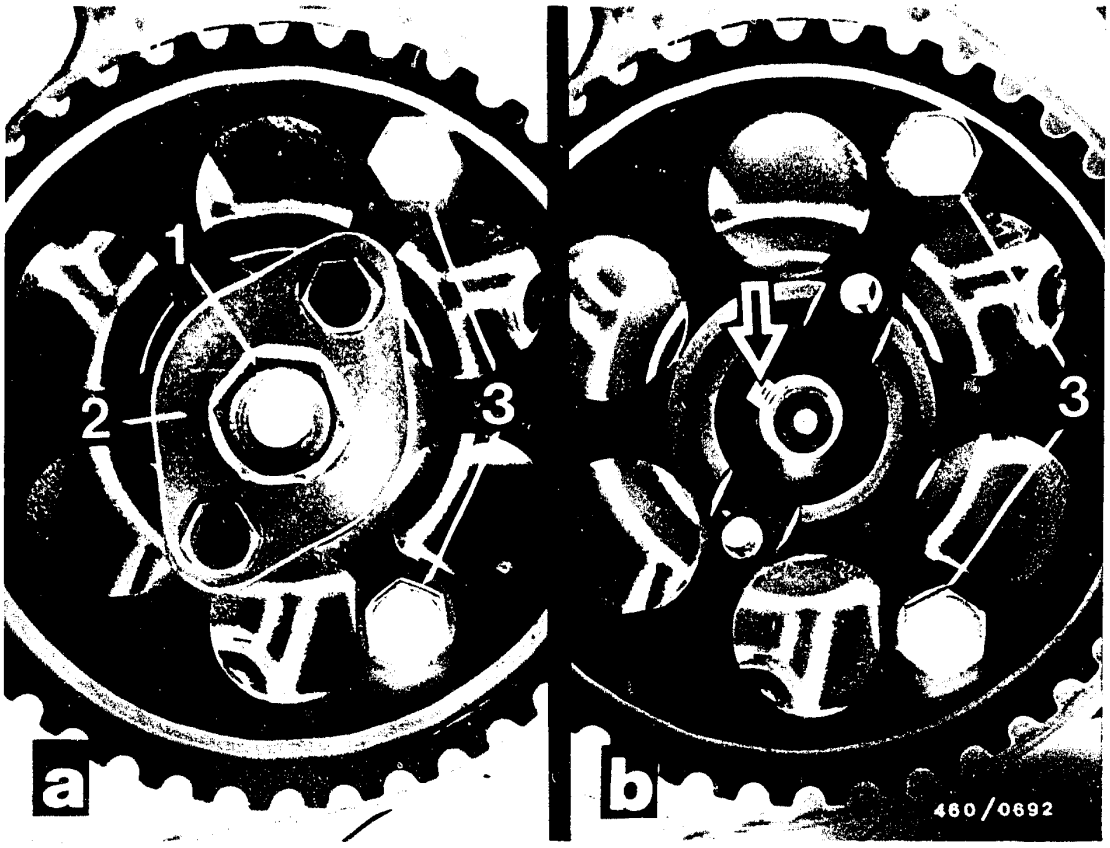
Prevent the delivery-valve holders from coming loose by holding with a wrench.

Remove injection-pump fastening screws (arrows).



1 = Fastening nut
2 = Puller flange
3 = Locating screws

Force injection pump out of drive gear by loosening the fastening nut (1).



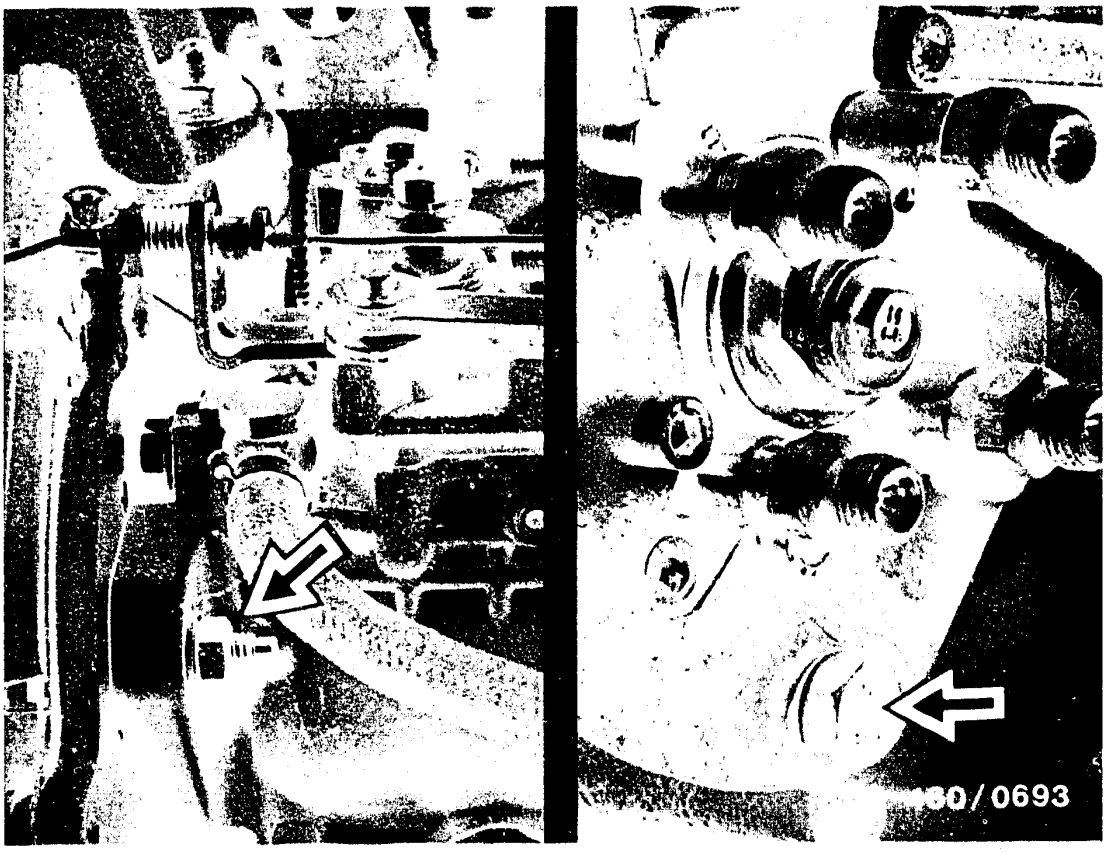
1 = Fastening nut
2 = Puller flange
3 = Locating screws

24. Install fuel-injection pump

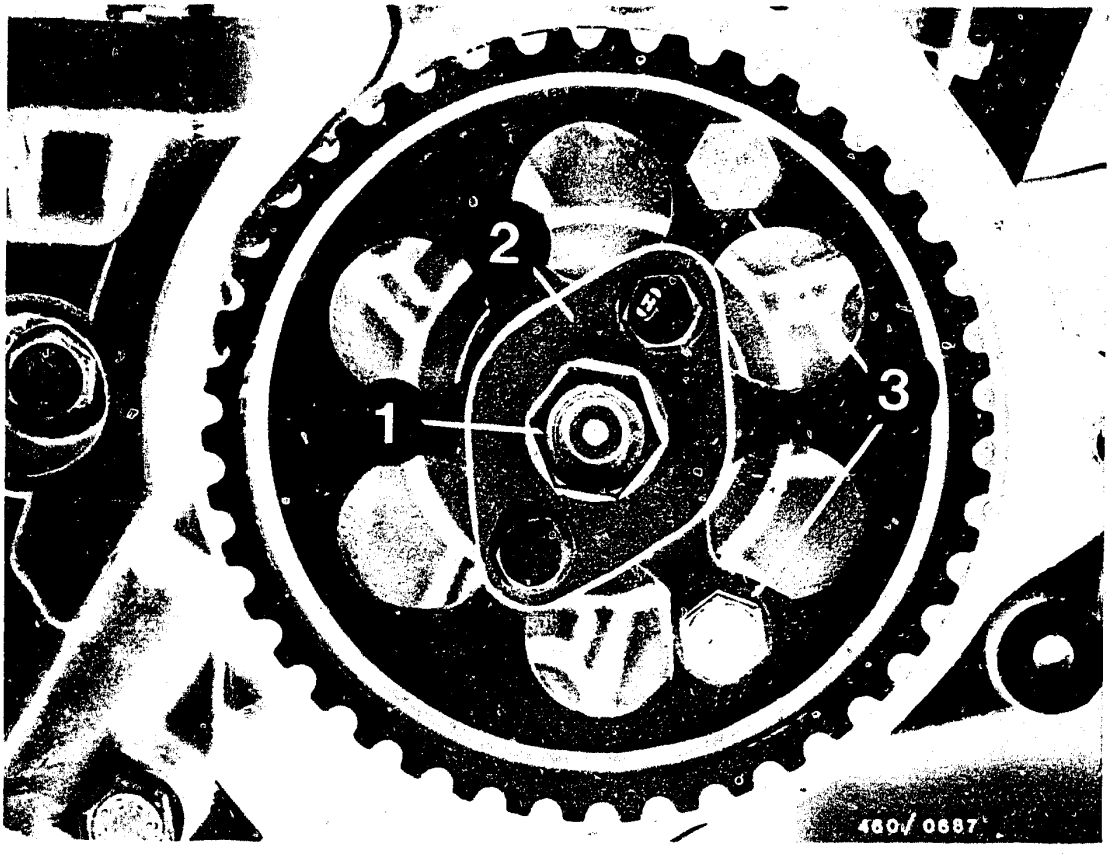
Remove puller flange of injection-pump gear (2 screws, Fig. a).

Insert injection pump into bore of pump drive gear (Fig. b), paying attention to seat of Woodruff key in groove of drive gear (arrow).

Position fastening nut.



Position injection-pump fastening screws (arrows) and finger-tighten.



1 = Fastening nut
2 = Puller flange
3 = Locating screws

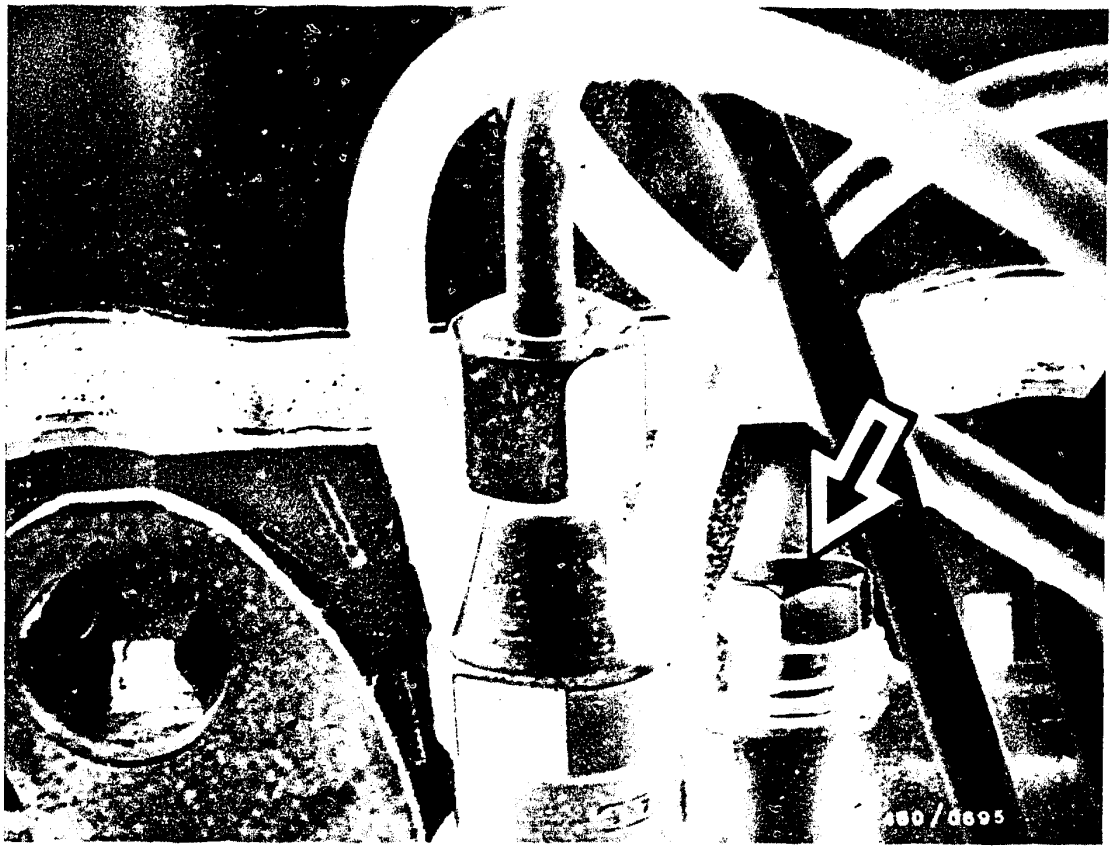
Tighten fastening nut to 50 Nm.

Mount puller flange.

Remove locating screws.

Note:

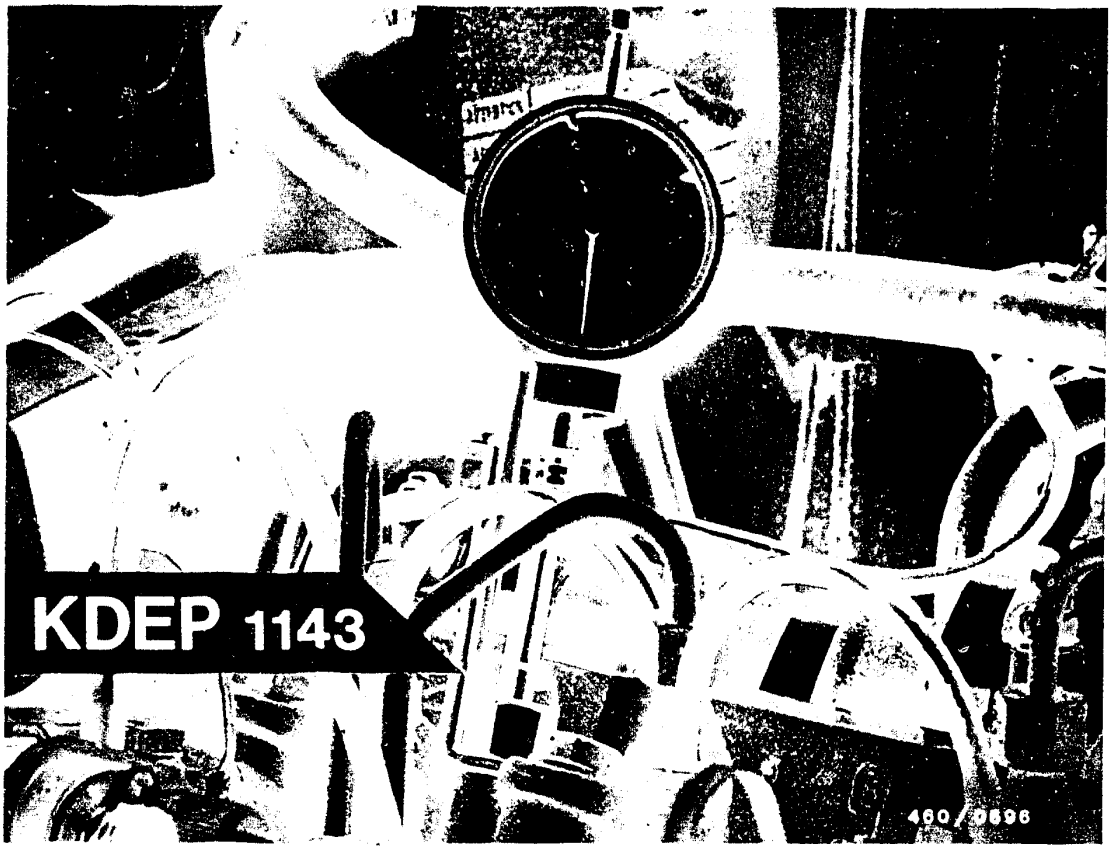
Do not change position of pump drive gear.



Unscrew screw plug on cylinder head (arrow).

Remove setting mandrel KDEP 1145 from flywheel.

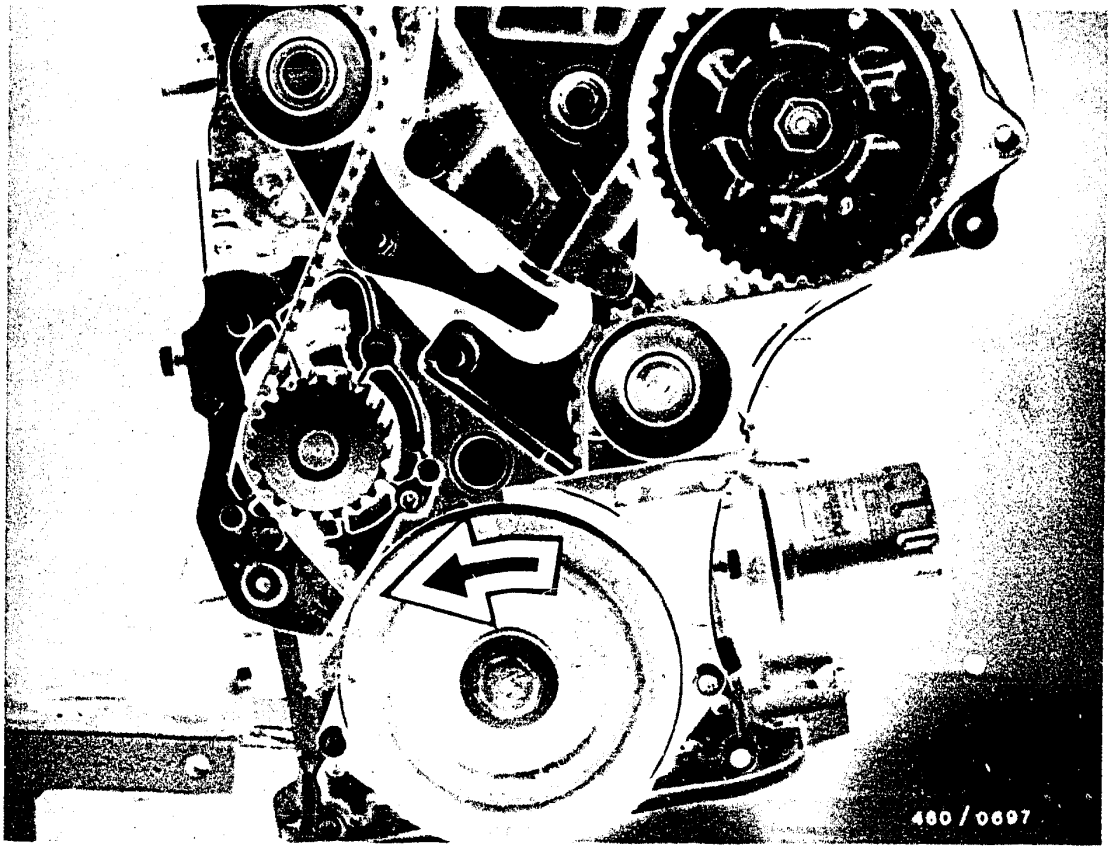
Remove sheathed-element glow plugs.



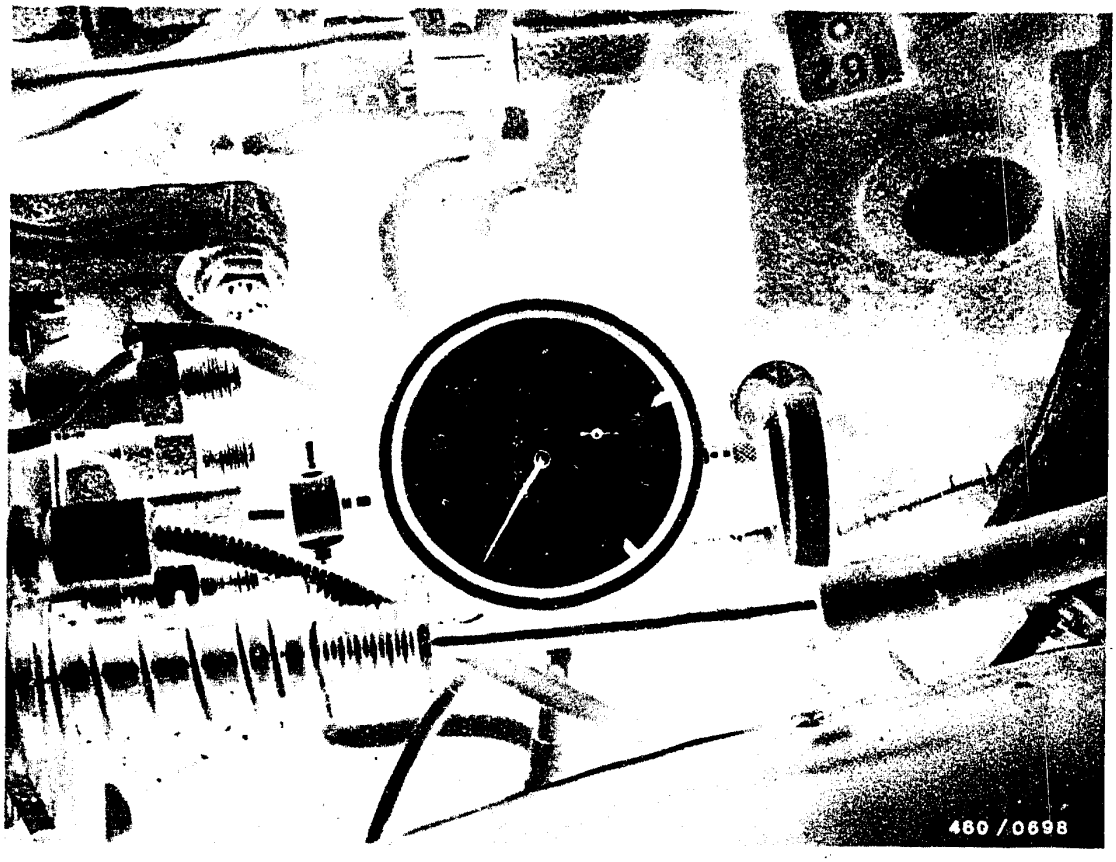
Mount measuring tool KDEP 1143 with dial indicator in tapped hole of plug.

Align dial indicator and preload.

Find TDC position of cylinder 4 and set dial indicator to "0".



Turn crankshaft 1/8 turn against engine direction of rotation (direction of arrow).



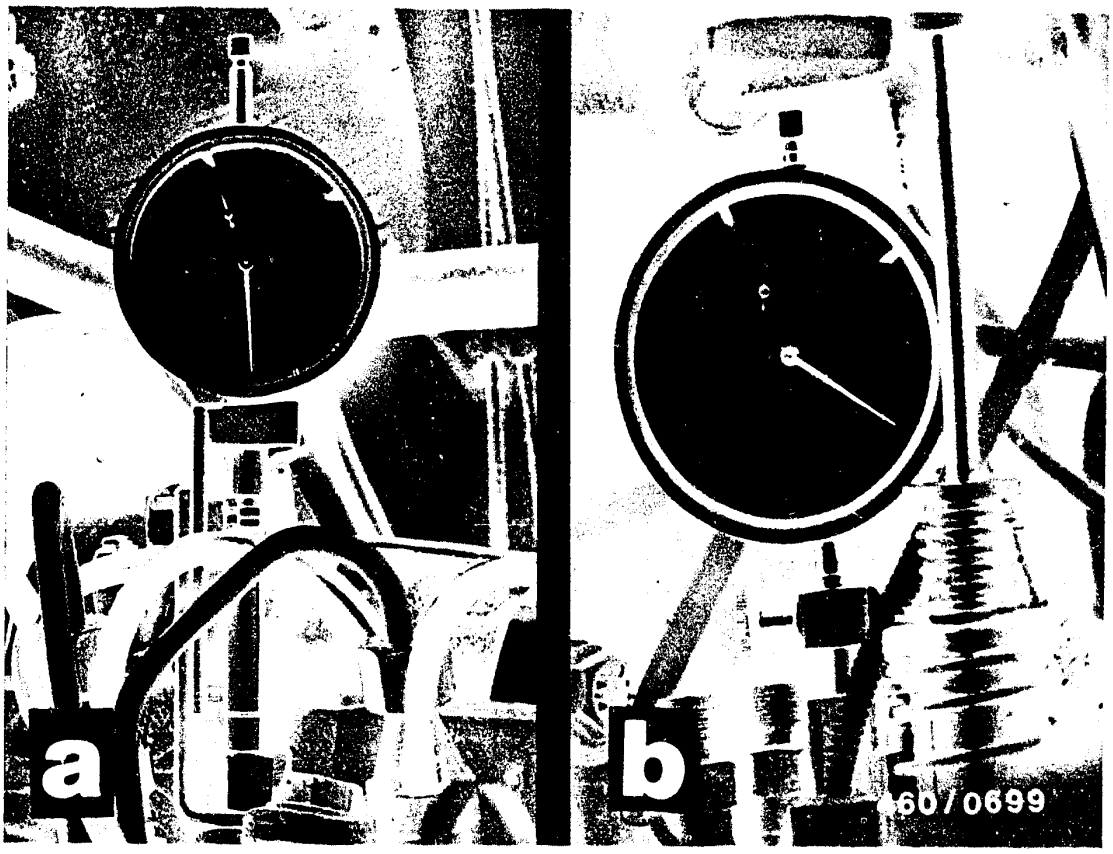
Unscrew bleeder screw from central screw plug (triangular plug) of hydraulic head.

Mount measuring tool KDEP 1085 with dial indicator in tapped hole.

Preload dial indicator by approx. 2.5 mm.

Slowly turn crankshaft against engine direction of rotation until the pointer of the dial indicator no longer moves.

Set dial indicator to "0".



Set crankshaft in engine direction of rotation to the correct value for the vehicle (Fig. a).

Peugeot 309	1.9 D		
Peugeot 305	1.9 D		
Talbot Horizon	1.9 D	Cylinder 4	0.57 mm BTDC
Citroen BX	1.9 D		
Peugeot 205	1.7 D	Cylinder 4	0.80 mm BTDC
Citroen Visa	1.7 D		

At the stated piston positions the dial indicator on the injection pump must indicate a plunger stroke of 0.29... 0.31 mm ABDC (Fig. b).

If necessary, correct the plunger stroke by pivoting the injection pump.

Testing the injection timing

Turn engine crankshaft in engine direction of rotation until cylinder 4 is at TDC.

Check zero position of dial indicator on cylinder 4.

Turn crankshaft 1/4 turn against engine direction of rotation, then slowly turn back in direction of rotation until pump plunger stroke of 0.30 mm ABDC.

In this position the engine piston must be:

Peugeot 309	1.9 D	
Peugeot 305	1.9 D	
Talbot Horizon	1.9 D	0.54 ... 0.60 mm BTDC
Citroen BX	1.9 D	
Peugeot 205	1.7 D	0.77 ... 0.83 mm BTDC.
Citroen Visa	1.7 D	

If incorrect, set engine piston to 0.57 mm or 0.80 mm BTDC and set injection pump to 0.30 mm ABDC by pivoting.

Tighten injection-pump fastening screws to 25 Nm.

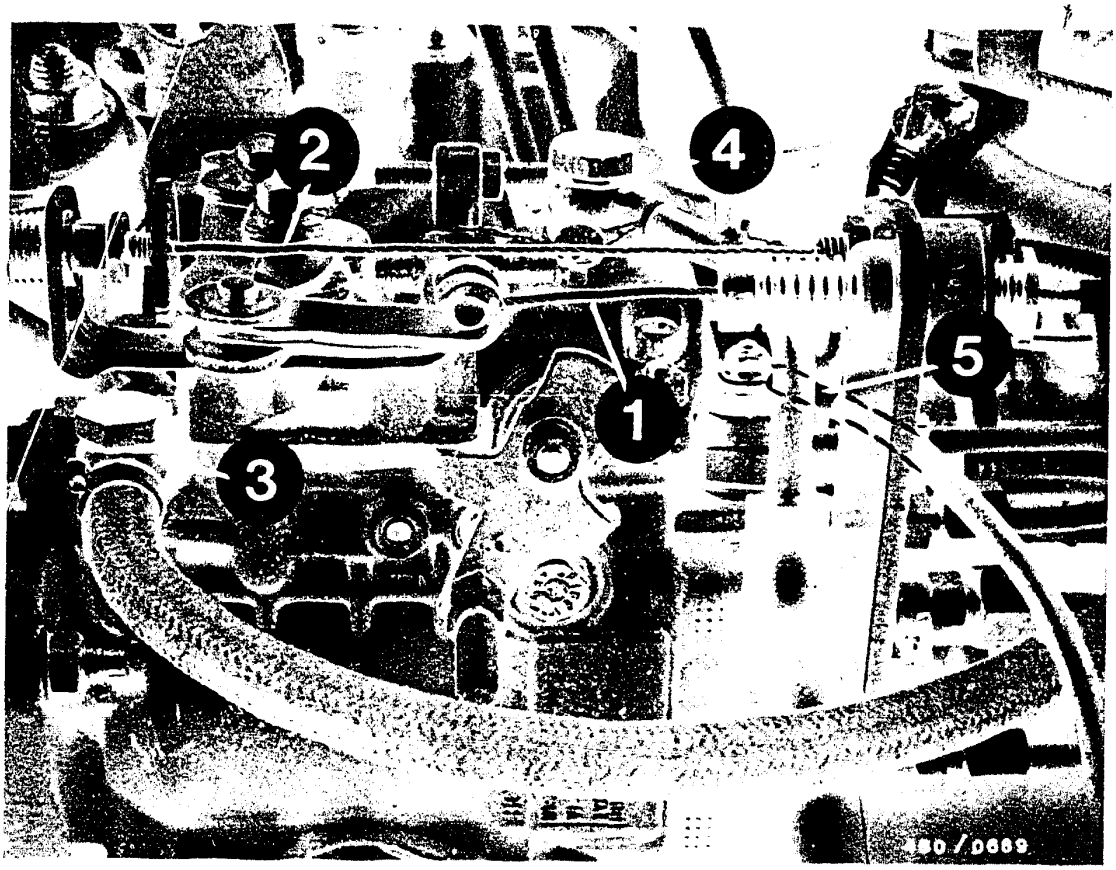
Remove measuring tools KDEP 1085 and KDEP 1143 with dial indicator and holder.

Mount bleeder screw on injection pump with new seal ring.

Screw plug into cylinder head.

Mount cylinder head cover, toothed-belt protection cover and sheathed-element glow plugs.

Tighten injection lines with open box wrench KDEP 1115, preventing the delivery-valve holders from turning by holding with a wrench.



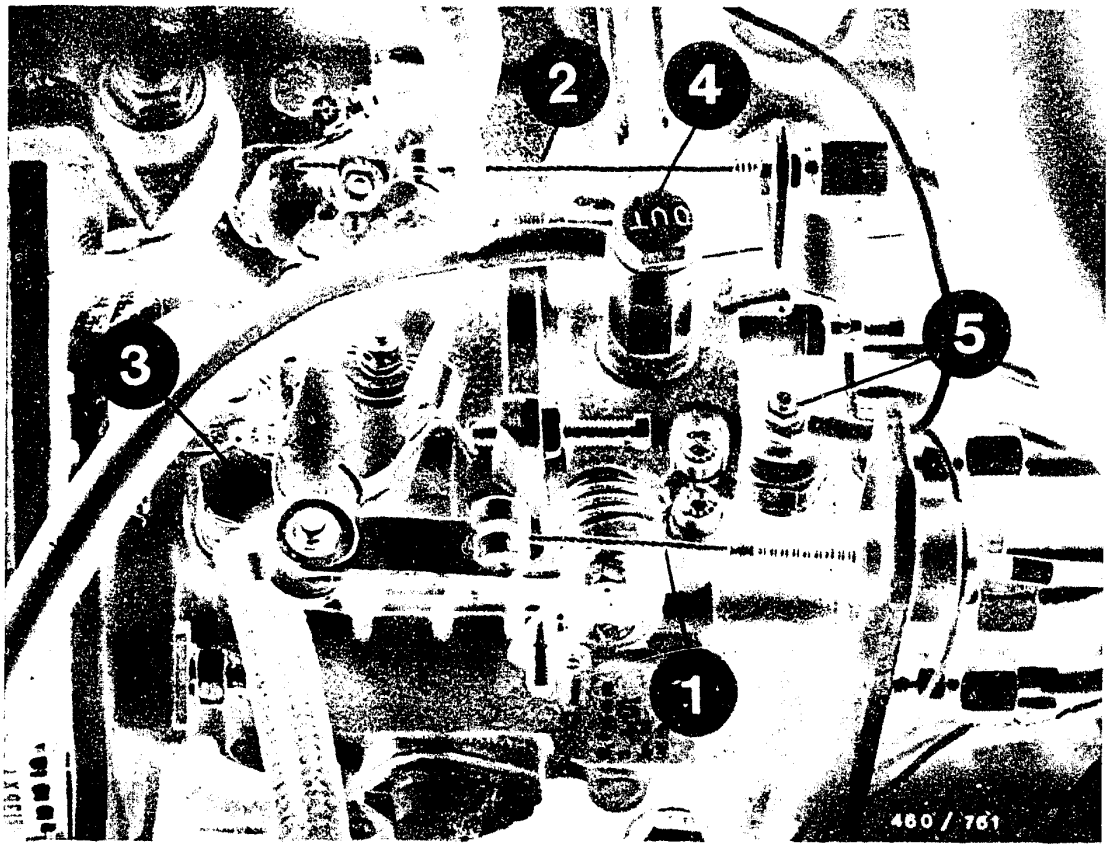
Injection pump without housing-rigid idle spring (LFG)

Mount injection-pump control-lever cable (1), cable for increased idle (2), fuel inlet line (3) and fuel return line (4).

Connect cable for electrical shutoff device (5).

Note:
Do not mix up the inlet-union screws of the fuel inlet and return lines.
The inlet-union screw of the return is provided with restriction bores and the head of the screw is marked "out".

Connect negative cable to battery.

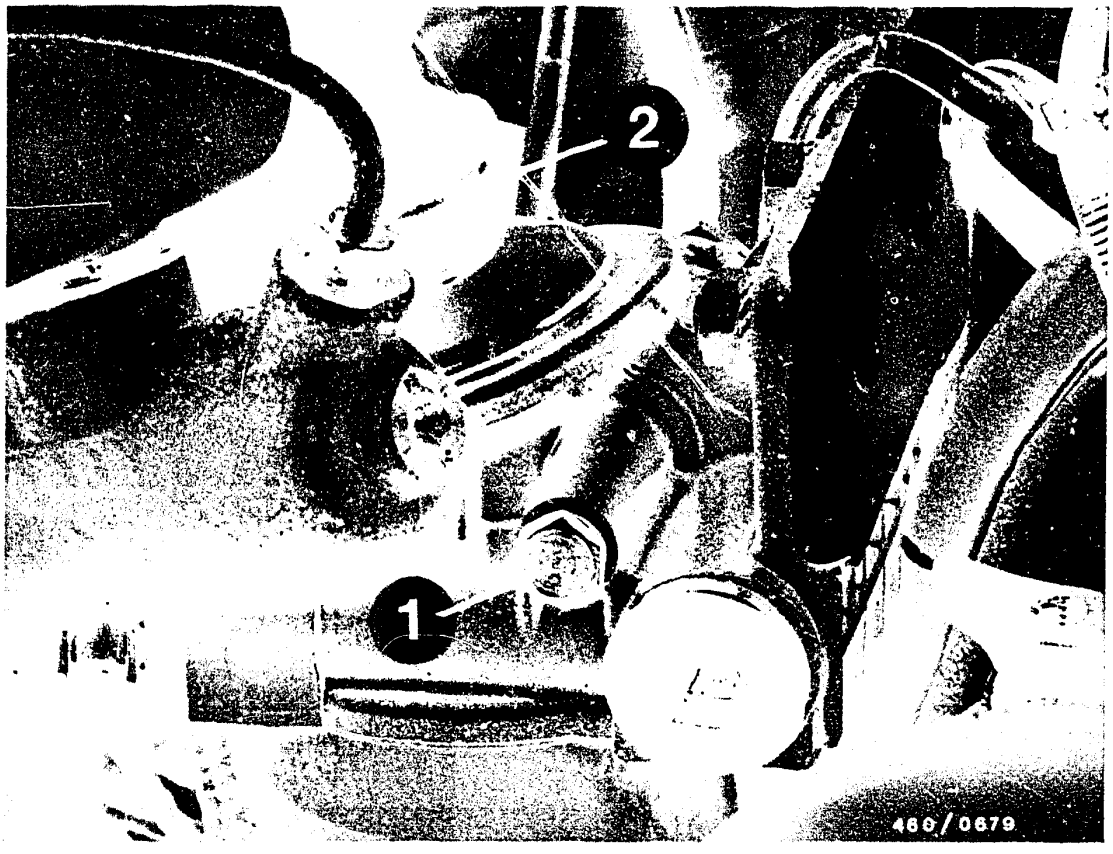


Injection-pump with housing-rigid idle spring (LFG)

Mount injection-pump control-lever cable (1), cable for increased idle (2), fuel inlet line (3), return line (4) and cable for electrical shutoff device (5).

Note:
Do not mix up the inlet-union screws of the fuel inlet and return lines.
The inlet-union screw of the return is provided with restriction bores and the head of the screw is marked "out".

Connect negative cable to battery.



1 = Bleeder screw 2 = Hand primer

Bleed fuel system.

Loosen bleeder screw on fuel filter and operate hand primer until fuel escaping from bleeder screw is free of bubbles.

Tighten bleeder screw.

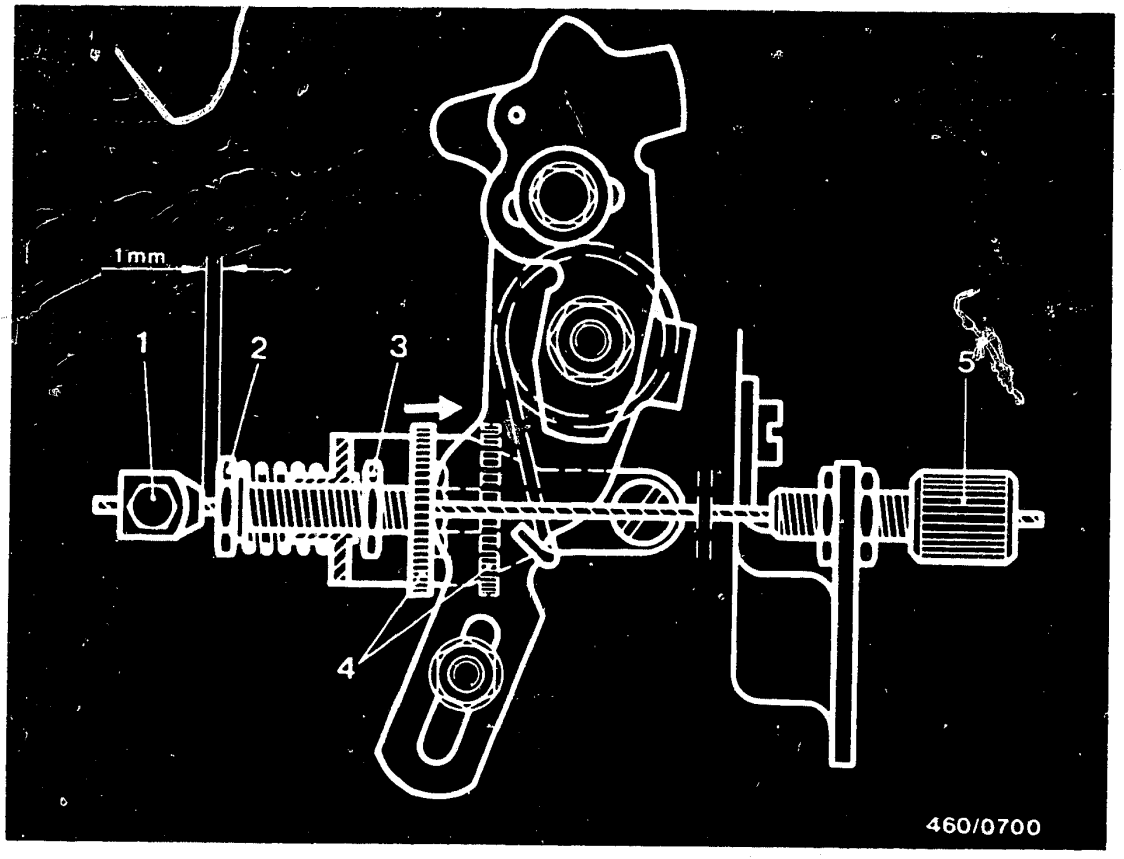
Continue to operate hand primer until resistance can be felt.

Loosen union nuts of fuel-injection tubing on nozzle-holder assemblies.

Operate starting motor without preheating until fuel escapes from union nuts of nozzle-holder assemblies (arrow).

Tighten union nuts.

Operate starting motor until engine starts.



Adjust idle-speed increase

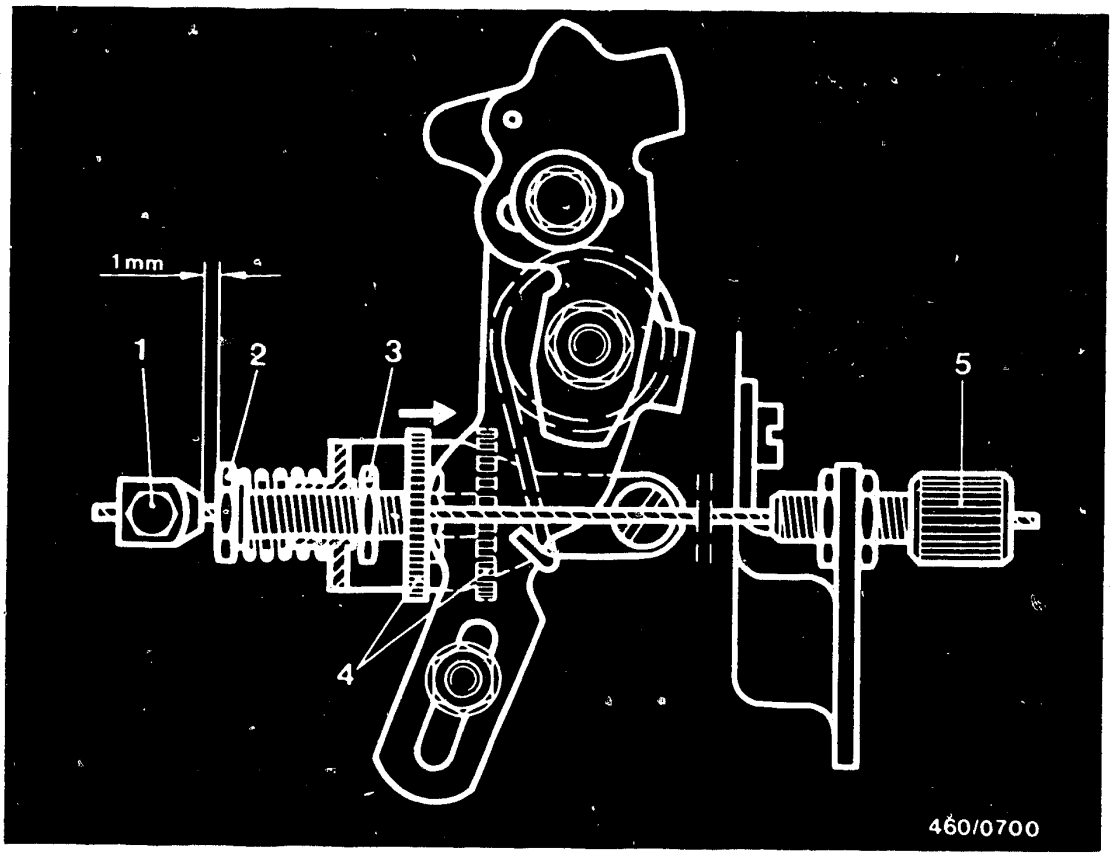
With the idle-speed increase off, there must be a gap of 1 mm between clamping piece (1) and hexagon nut (2).

Correct by means of clamping piece (1).

Start engine and warm up until radiator fan cuts in.

Operate idle-speed increase.

Engine speed must then be 1200 $\pm$ 50 min^{-1}.



If a correction is necessary, loosen lock nut (3).

Hold hexagon nut (2) with a wrench and turn knurled screw (4) until the correct engine speed 1200 $\pm$ 50 min^{-1} is reached.

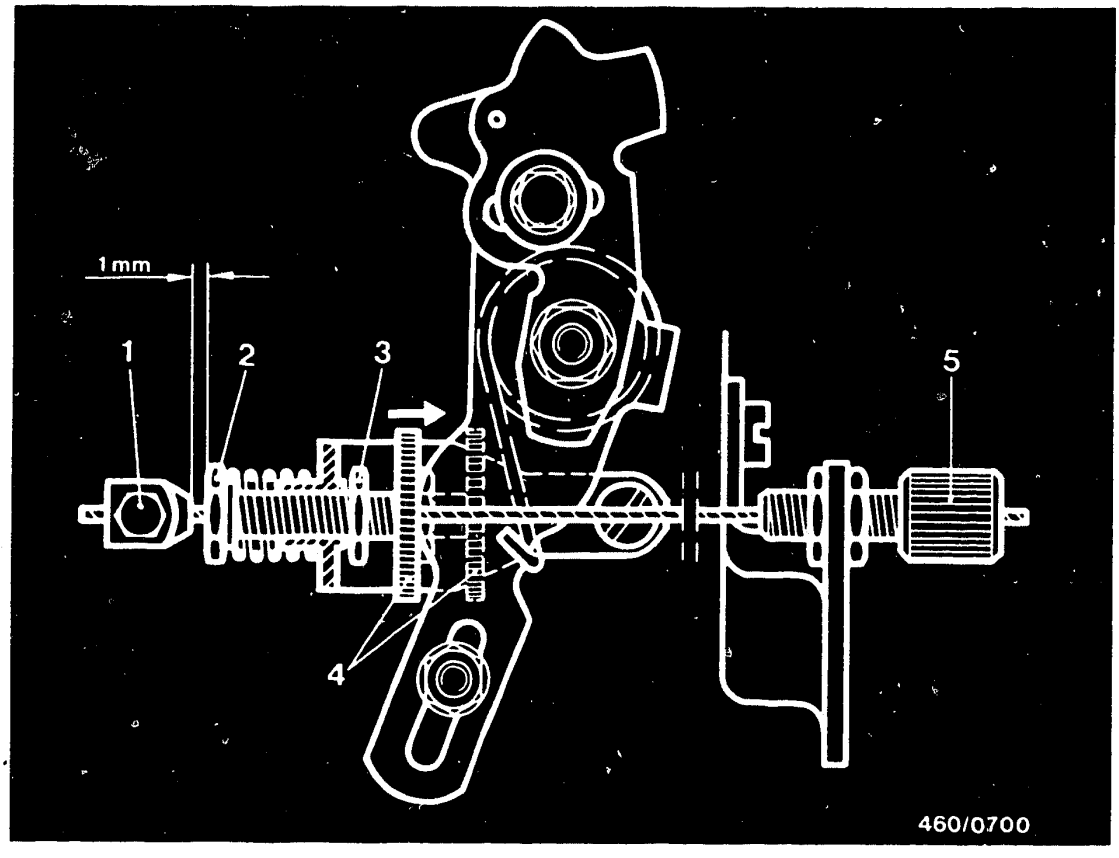
Tighten lock nut (3), while holding knurled screw (4).

Switch off idle-speed increase.

Loosen lock nuts of knurled screw (5).

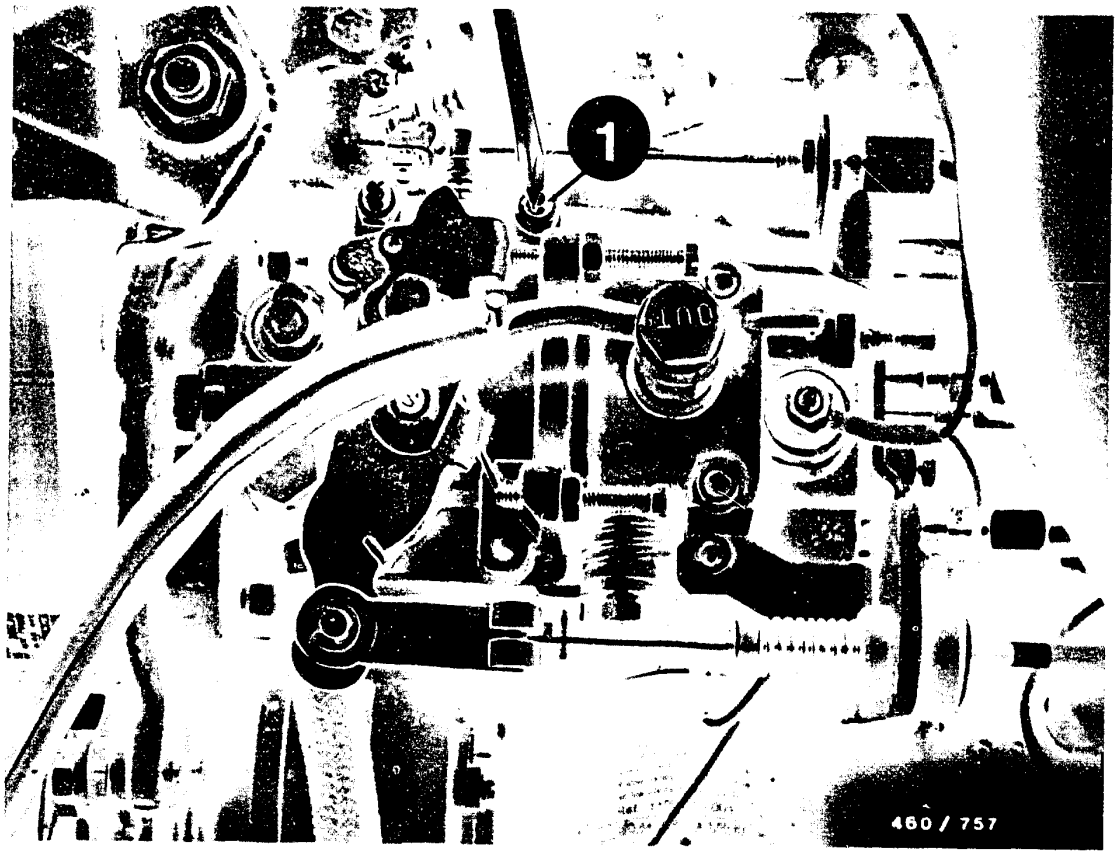
Bring knurled screw (5) up against sleeve of cable.

Re-tighten lock nut.



Check gap 1 mm between clamping screw (1) and hexagon nut (2).

If necessary, correct gap with clamping piece (1).



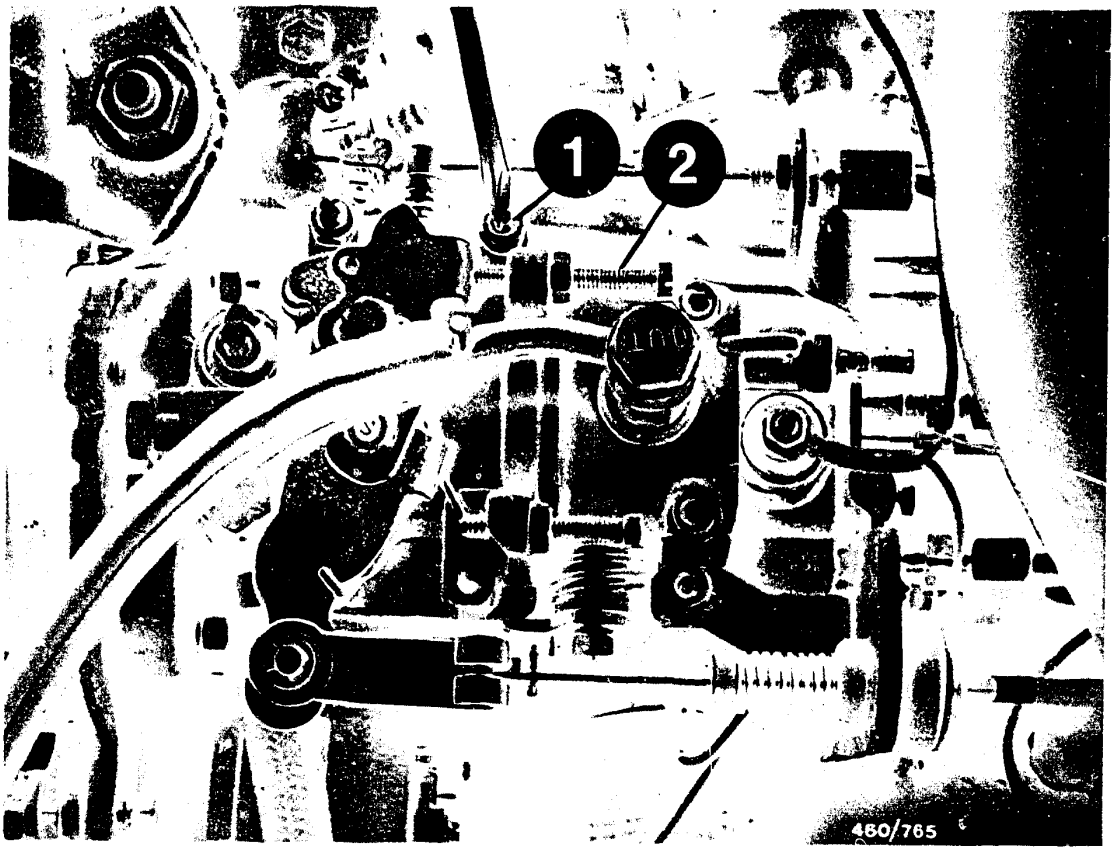
Adjust idle speed on injection pumps with housingrigid idle spring (LFG)

Connect tachometer (e.g. photoelectric) to engine. Start engine and operate at idle speed.

Note:
For adjusting the idle speed the engine must be at normal operating temperature, coolant temperature +80° C.

Set engine speed at idle-speed adjusting screw (1) to 800 + 50 min-1.

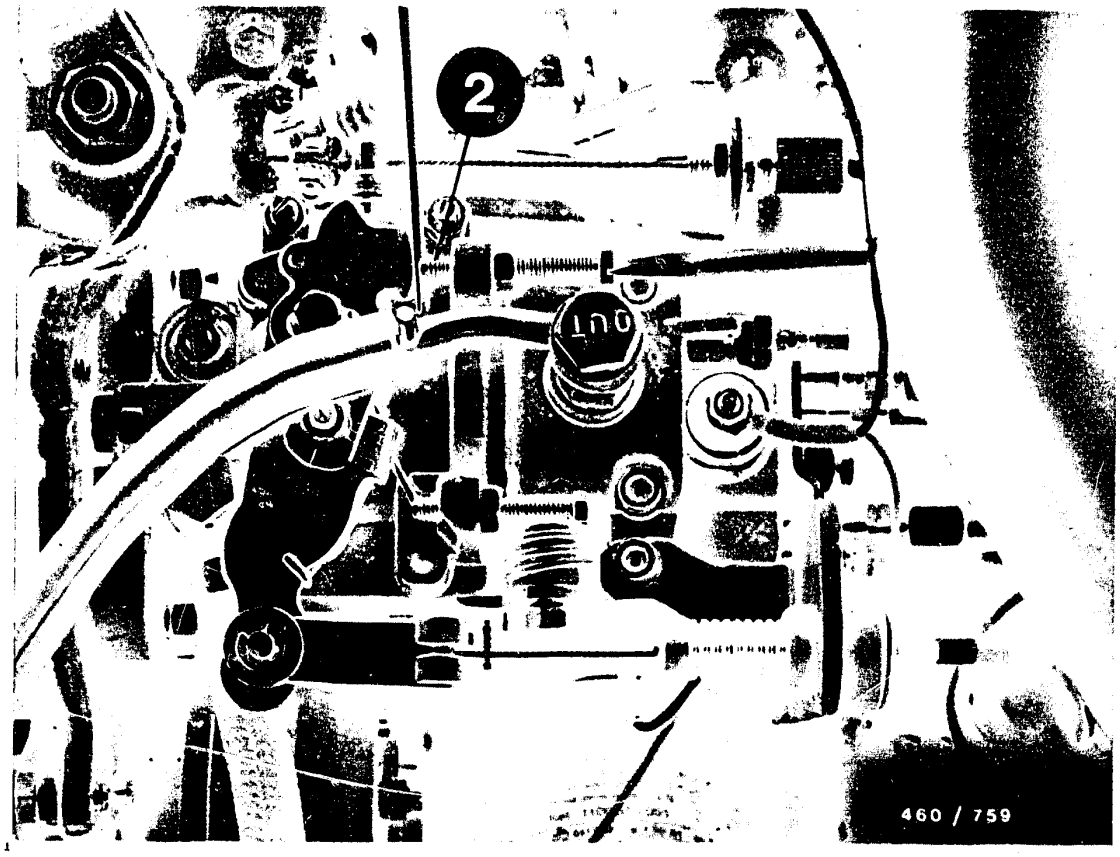
Note that the camshaft and the injection pump are driven at half the engine speed.



If the idle cannot be adjusted by turning the adjusting screw (1), the residual delivery is set too high.

In this case, proceed as follows:

- Unscrew idle-speed adjusting screw (1) toward lower idle speed.
- Unscrew residual-delivery adjusting screw (2) until engine speed drops.
- Then unscrew residual-delivery adjusting screw by a further 2 turns and adjust idle speed at adjusting screw (1).

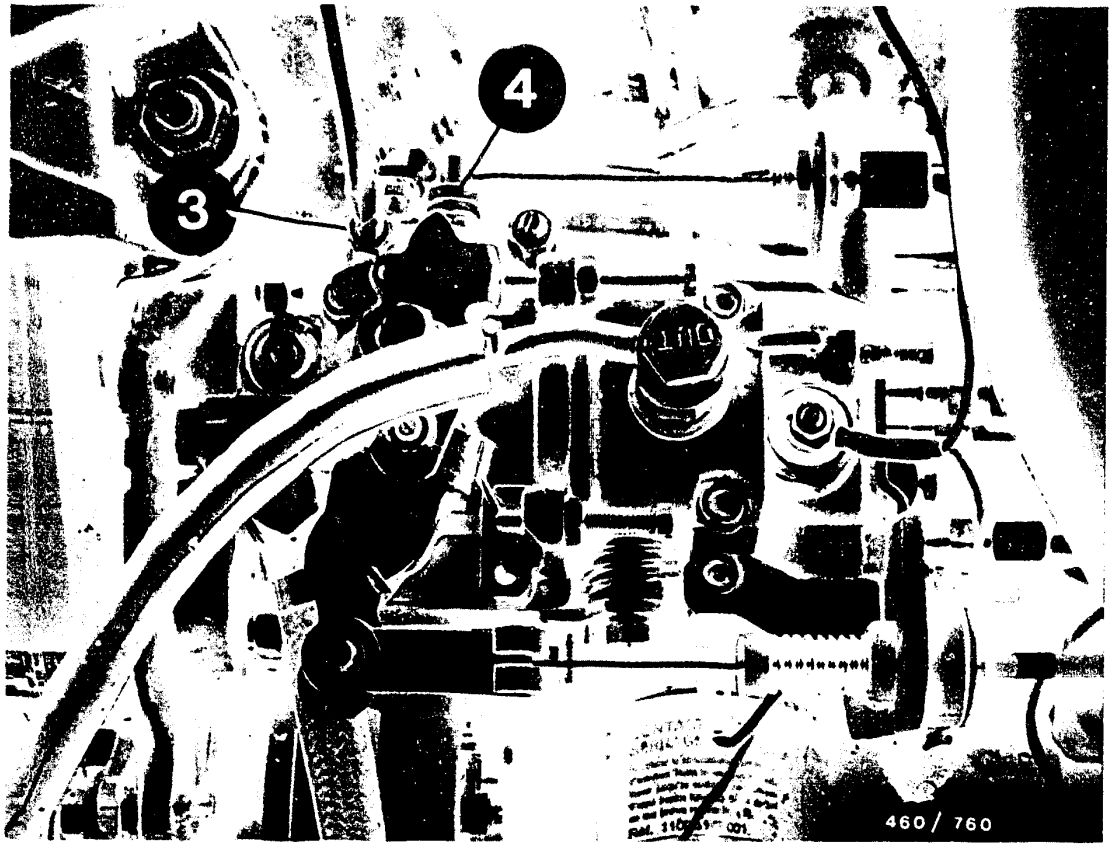


Adjust residual delivery

Insert a spacer piece (e.g. feeler gauge) of 1 mm between residual-delivery screw (2) and speed control lever.

Screw in residual-delivery adjusting screw (2) until the engine speed has risen by 20 revolutions as compared to the set idle speed.

Remove spacer piece.

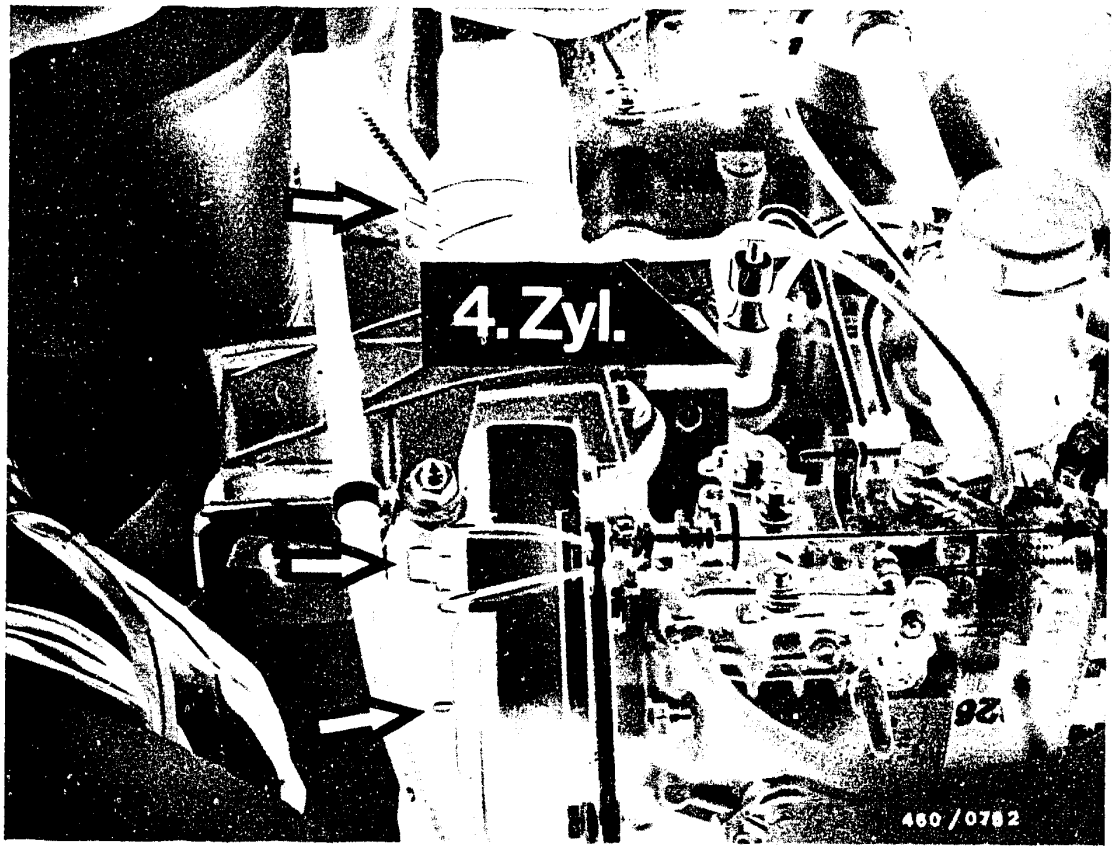


Adjust idle increase (with LFG)

Bring idle-adjusting lever (4) up against adjusting screw (3) for increased idle.

Set engine speed for increased idle to 950 + 50 min^{-1}.

After adjusting, lock adjusting screw and seal.



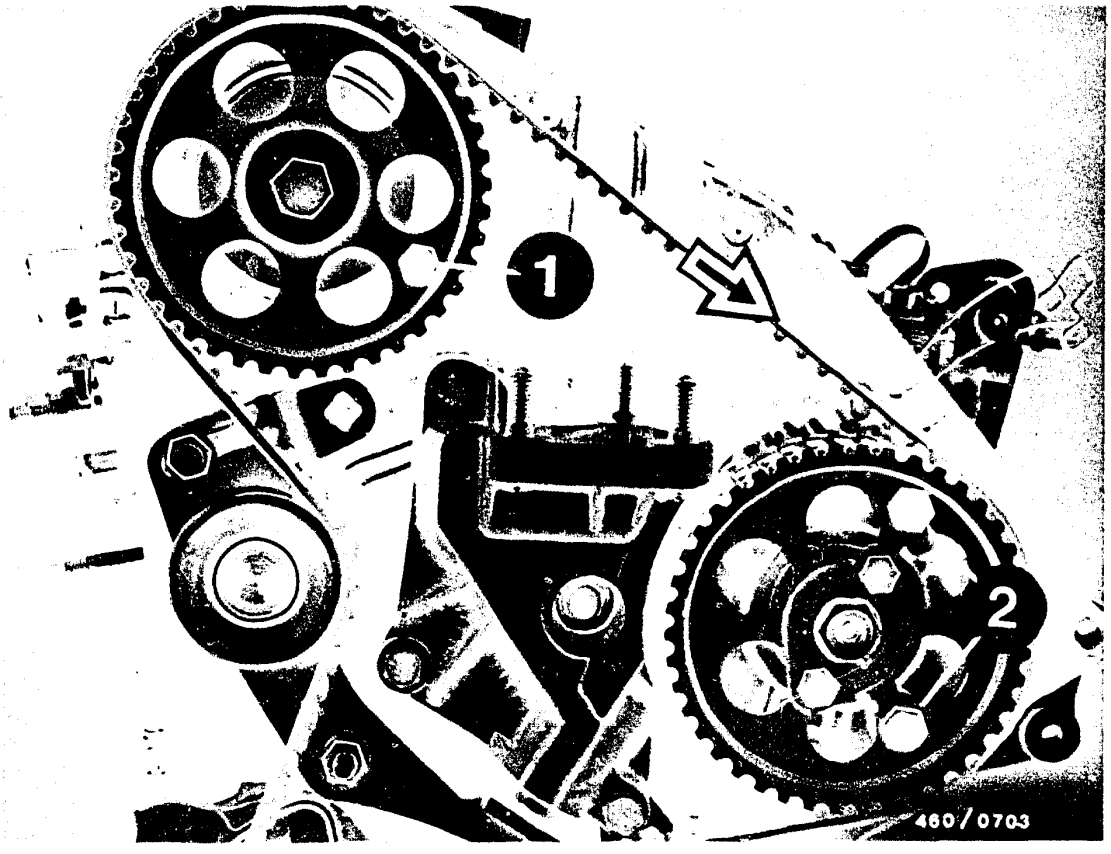
25. Test and adjust engine timing

25.1 Test engine timing

Remove toothed-belt protection cover (front and rear halves). To do this, loosen holding clamps (arrows).

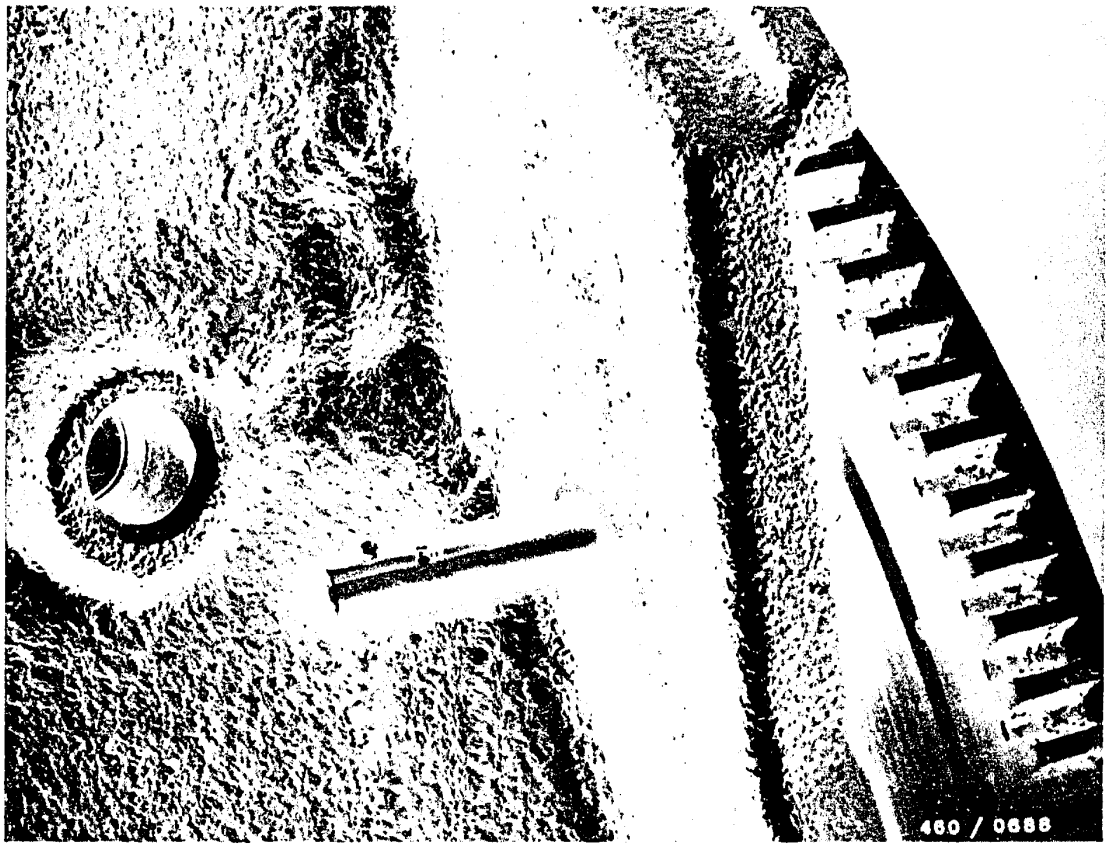
Remove cylinder-head cover.

Turn crankshaft to TDC on cylinder 4 (cylinder 1 on valve overlap).



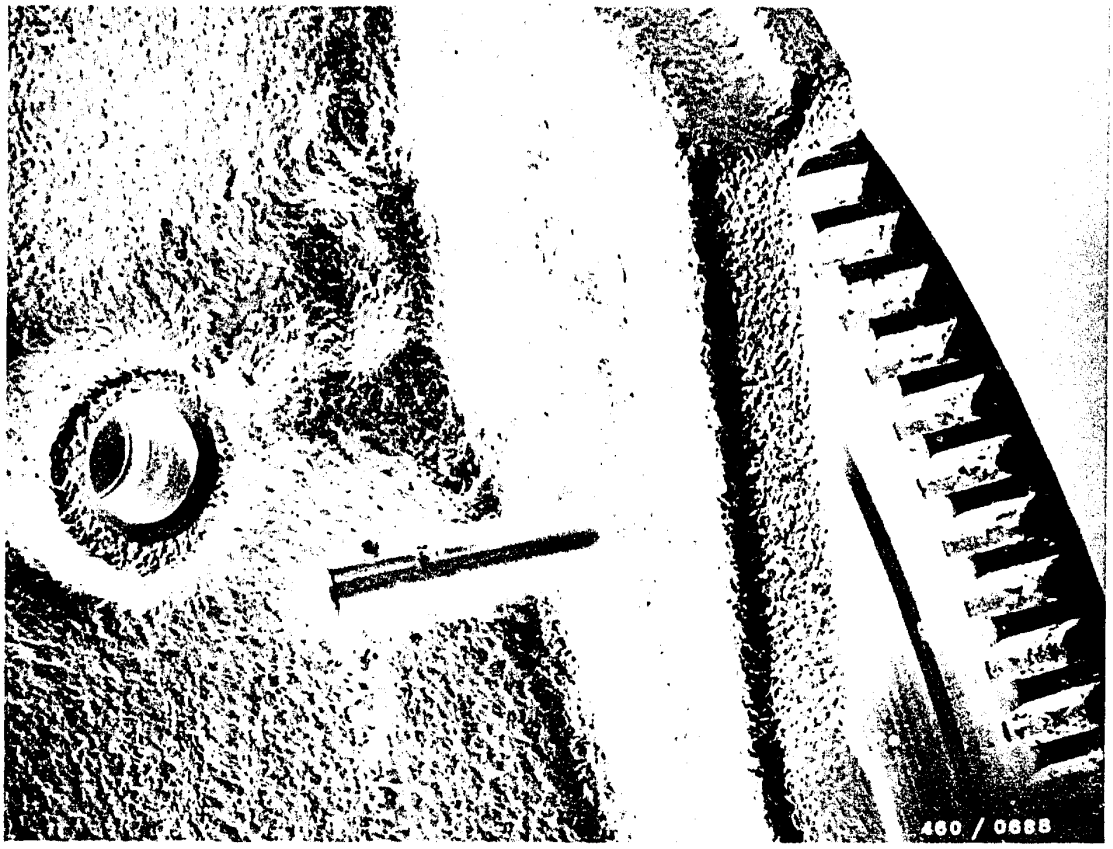
Locate camshaft drive gear with screw 8 x 40 mm (1) and locate injection-pump drive gear with screws 8 x 30 mm (2) in existing tapped holes and screw down by hand.

Note:
Arrow = engine direction of rotation.



Locate flywheel with setting mandrel KDEP 1145.

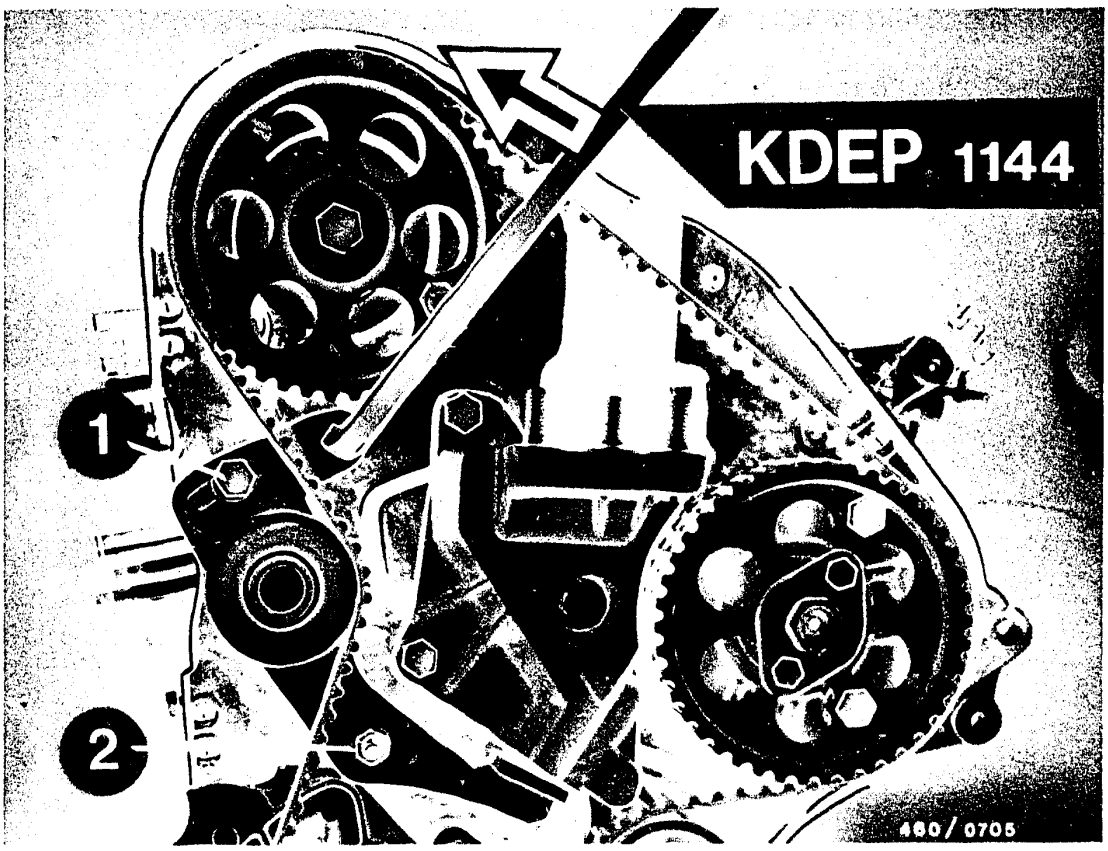
If the setting mandrel cannot be introduced, the engine timing must be corrected.



25.2 Adjust engine timing

Remove locating screws from camshaft and injection-pump gears.

Turn crankshaft so that setting mandrel KDEP 1145 can be introduced (picture).

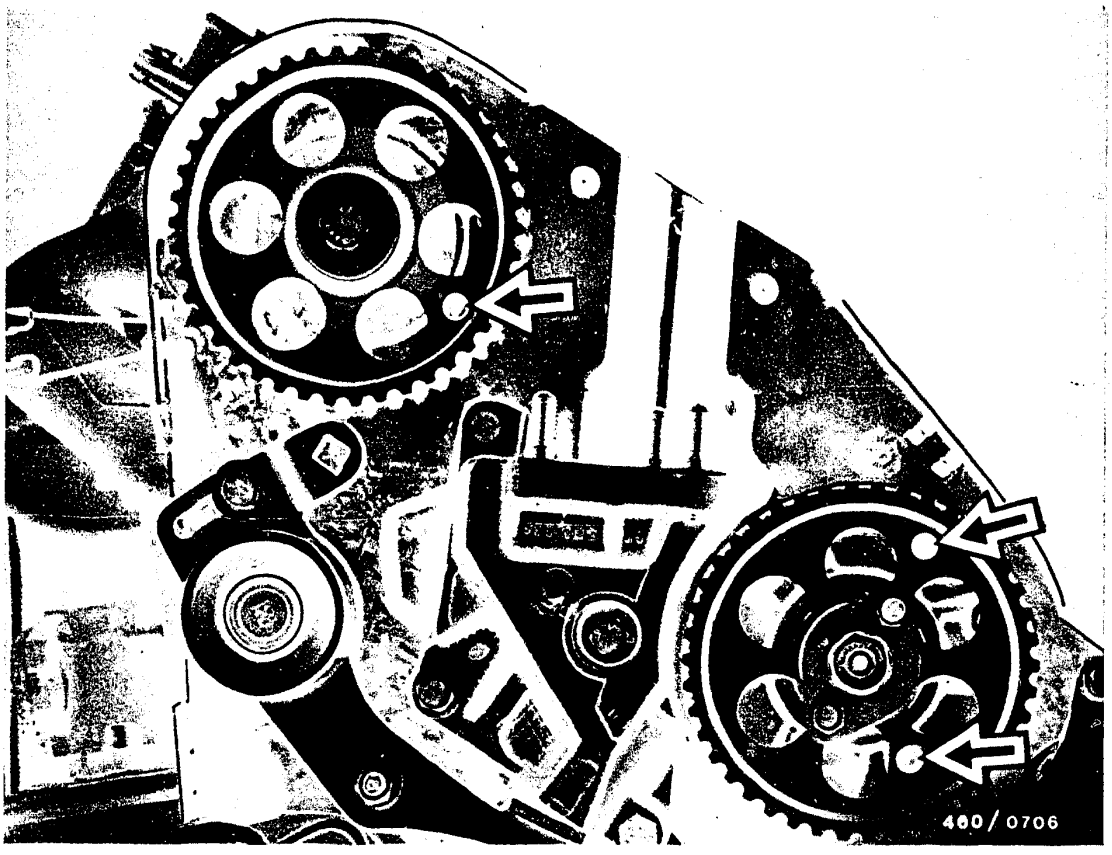


Loosen fastening screws (1 and 2) on toothed-belt tensioner.

Using tensioning lever KDEP 1144, press toothed-belt tensioner as far as it will go in direction of arrow.

Tighten fastening screw (1).

Remove toothed-belt from camshaft gear and injection-pump gear.



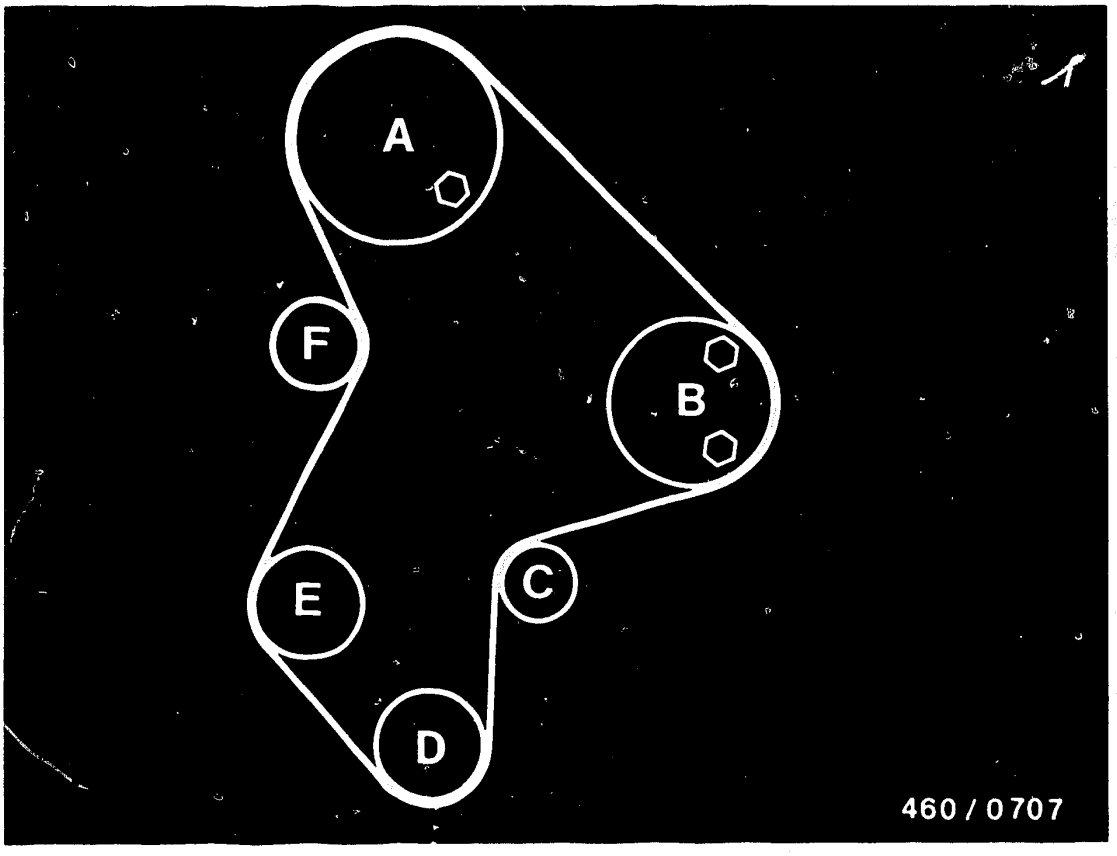
Turn injection-pump and camshaft gears so that they line up with the respective tapped holes (see picture, arrows).

Lock position of drive gears with screws (1 piece 8 x 40, 2 pieces 8 x 30 mm) and tighten by hand.

Note:

Note position of camshaft.

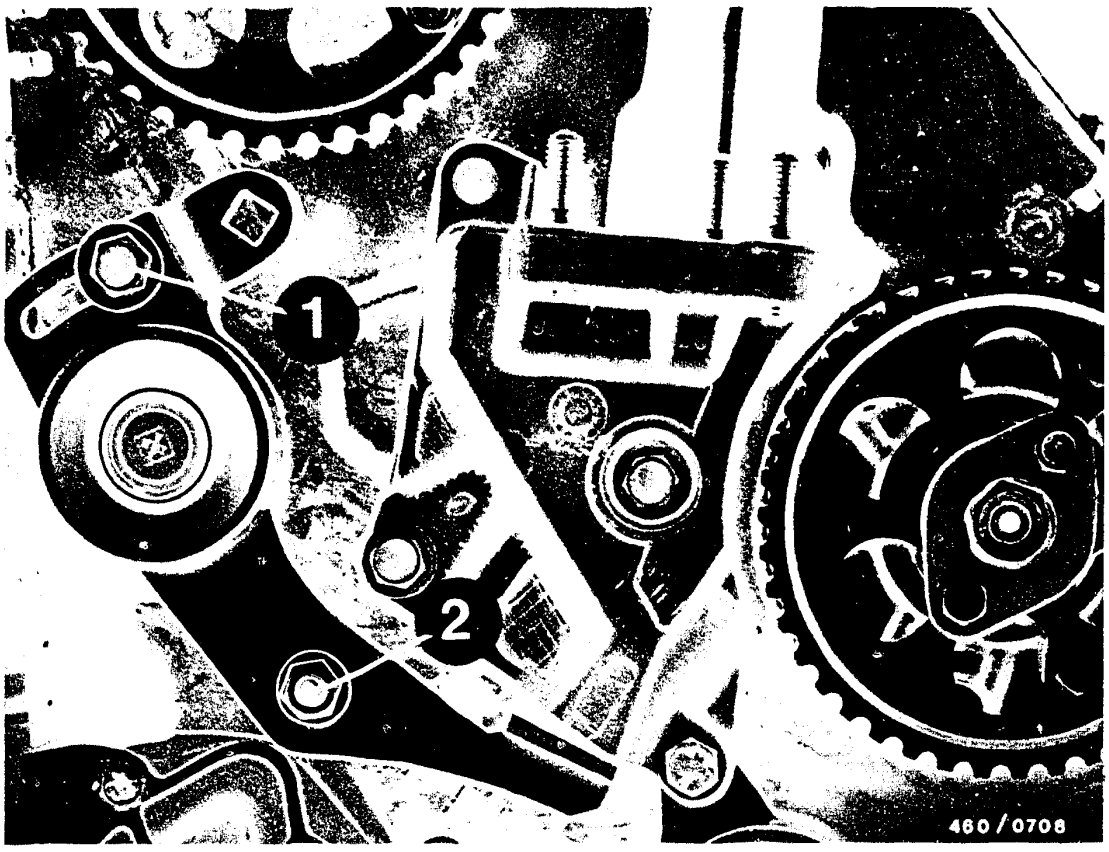
Cylinder 4 at TDC,
cylinder 1 on valve overlap.



A = Camshaft
B = Injection-pump
C = Guide roller (fixed)
D = Crankshaft
E = Water pump
F = Tensioner

Mount toothed-belt.

Put on toothed-belt in sequence D, C, B, A, F and E.



Loosen fastening screw (1) on toothed-belt tensioner.

Toothed-belt is automatically tensioned by built-in spring.

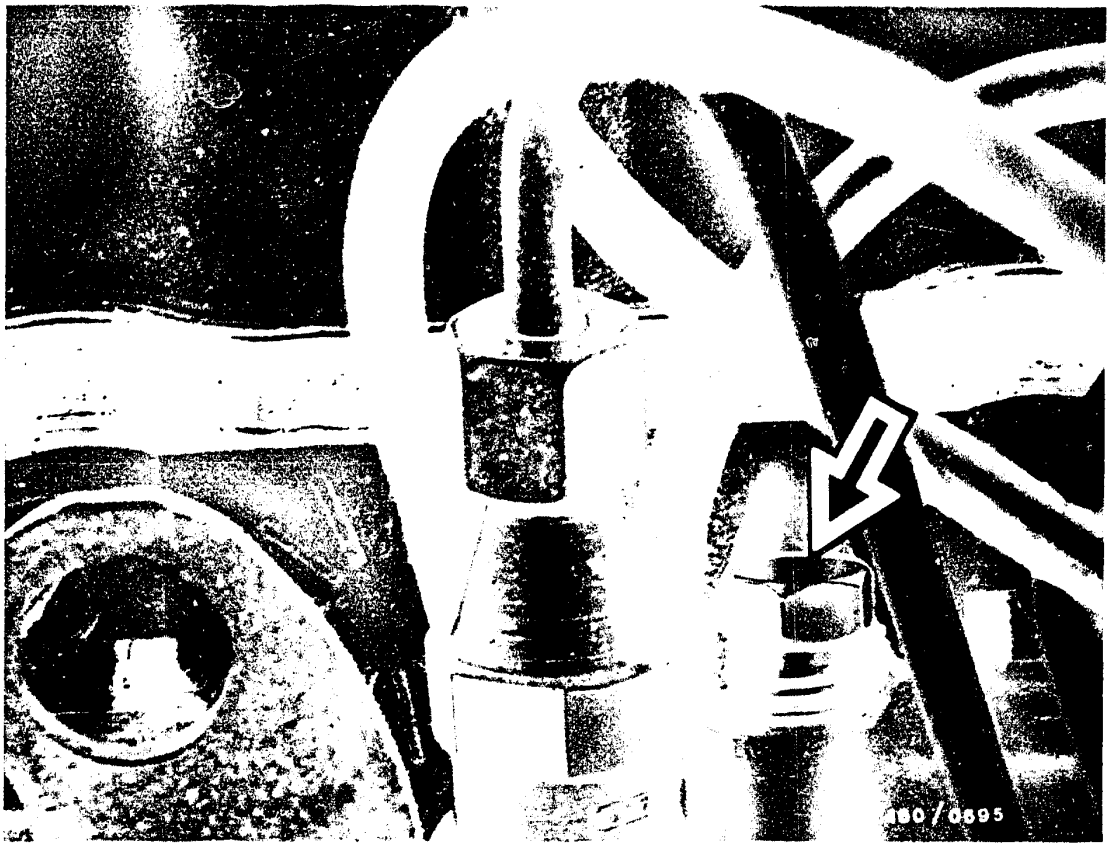
Tighten screws (1, 2) of toothed-belt tensioner.

Remove locating screws and setting mandrel KDEP 1145.

Turn crankshaft over twice in engine direction of rotation.

Lock drive gears with screws once again.

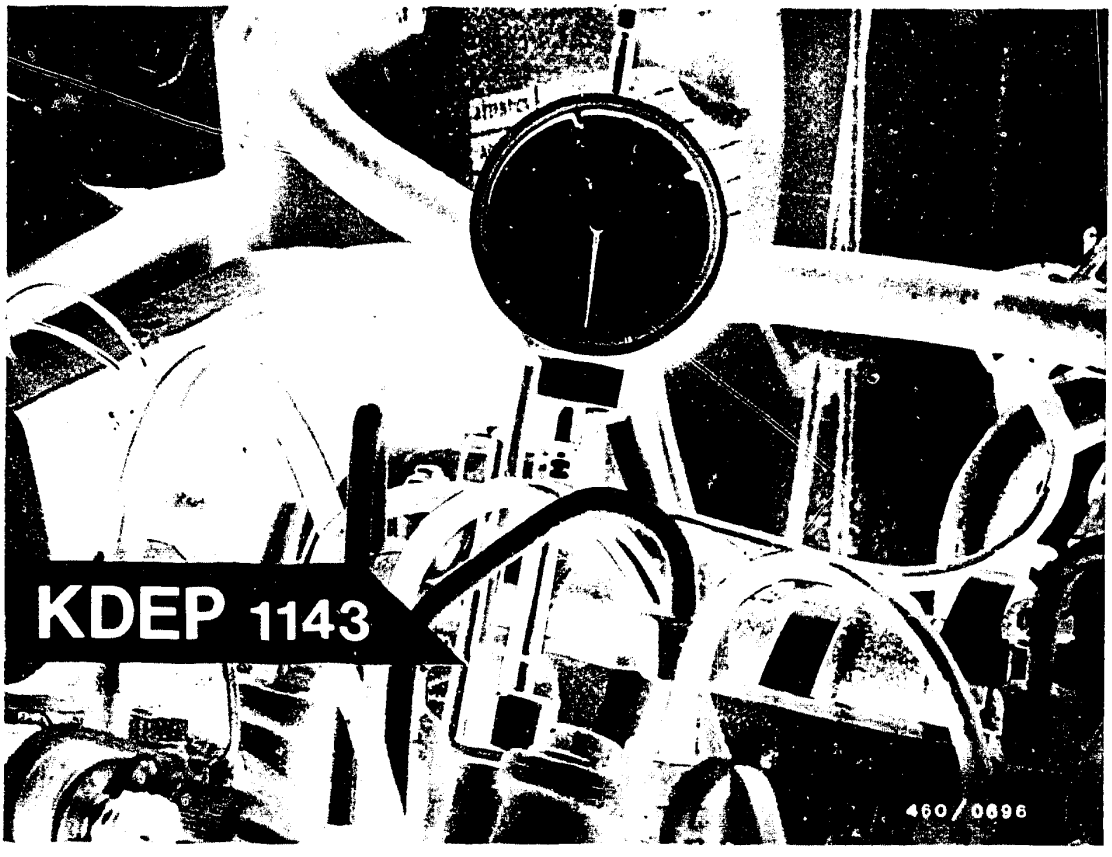
Loosen toothed-belt tensioner and tighten again to 20 Nm.



Unscrew screw plug on cylinder head (arrow).

Remove sheathed-element glow plugs.

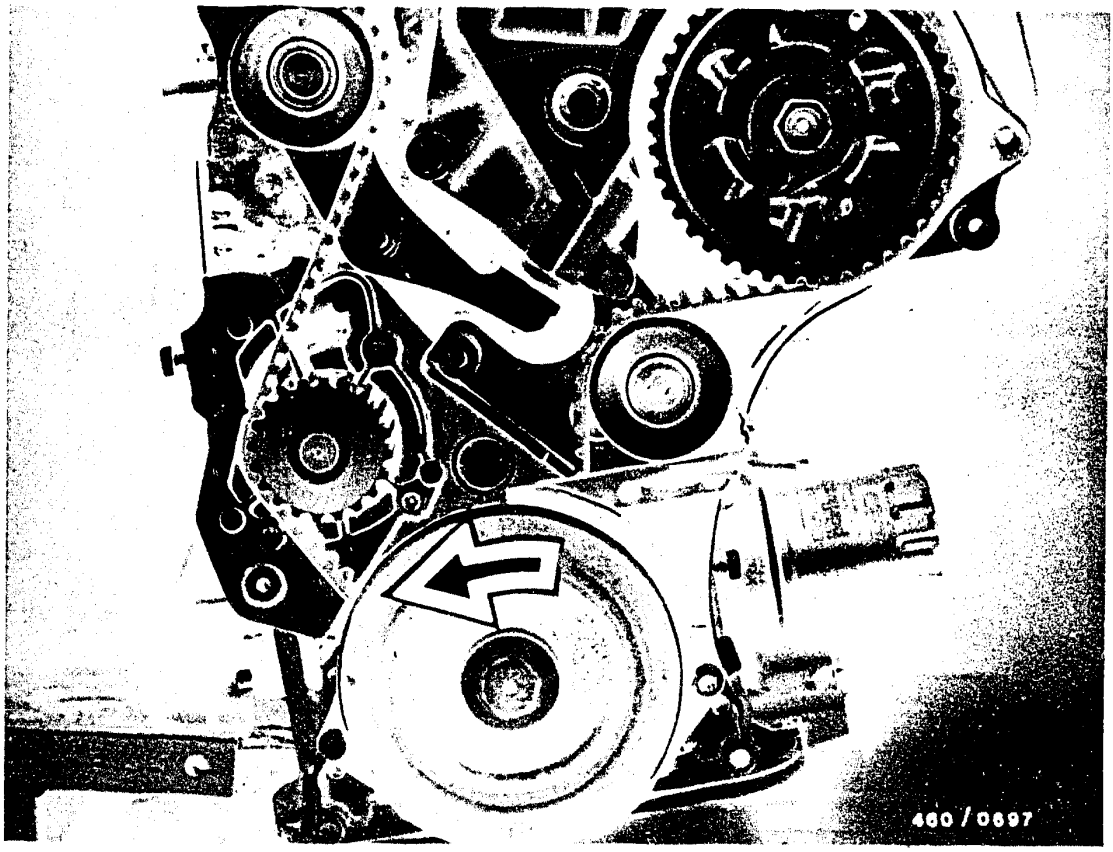
Remove locating screws of drive gears.



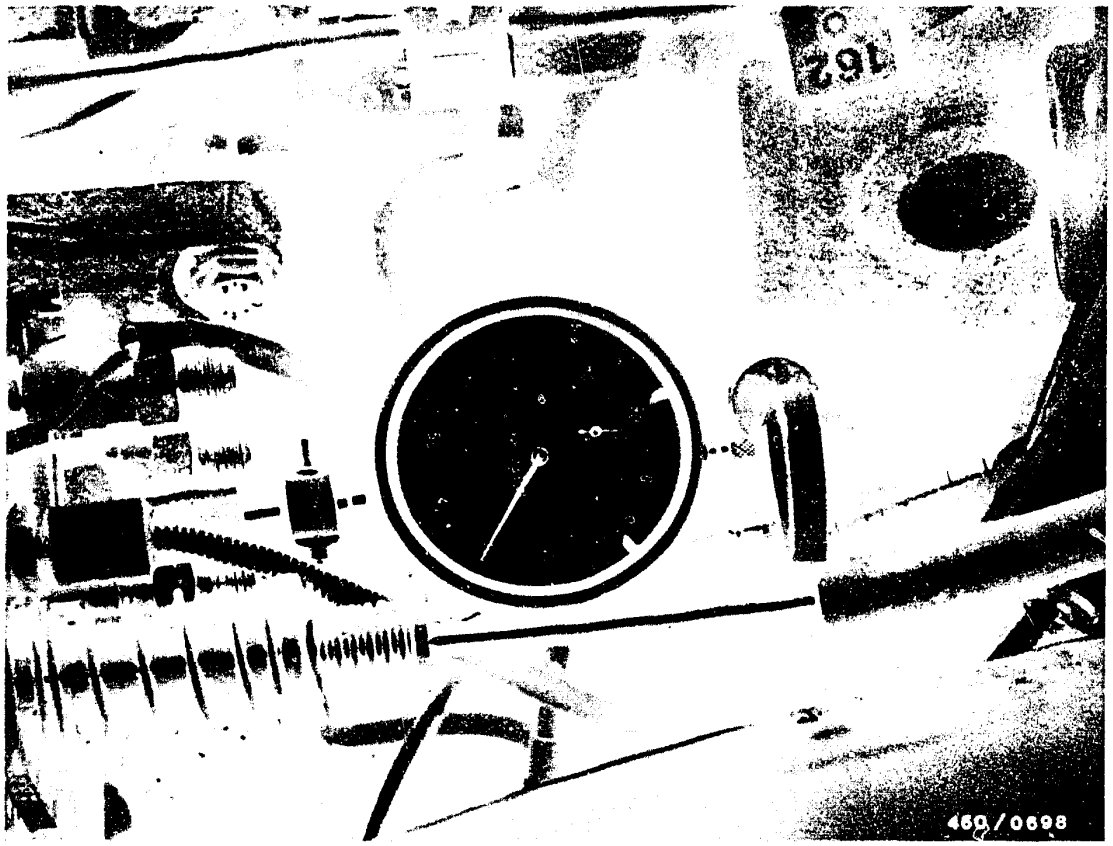
Mount measuring tool KDEP 1143 with dial indicator in tapped pole of plug.

Align dial indicator and preload.

Find TDC position of cylinder 4 and set dial indicator to "0".



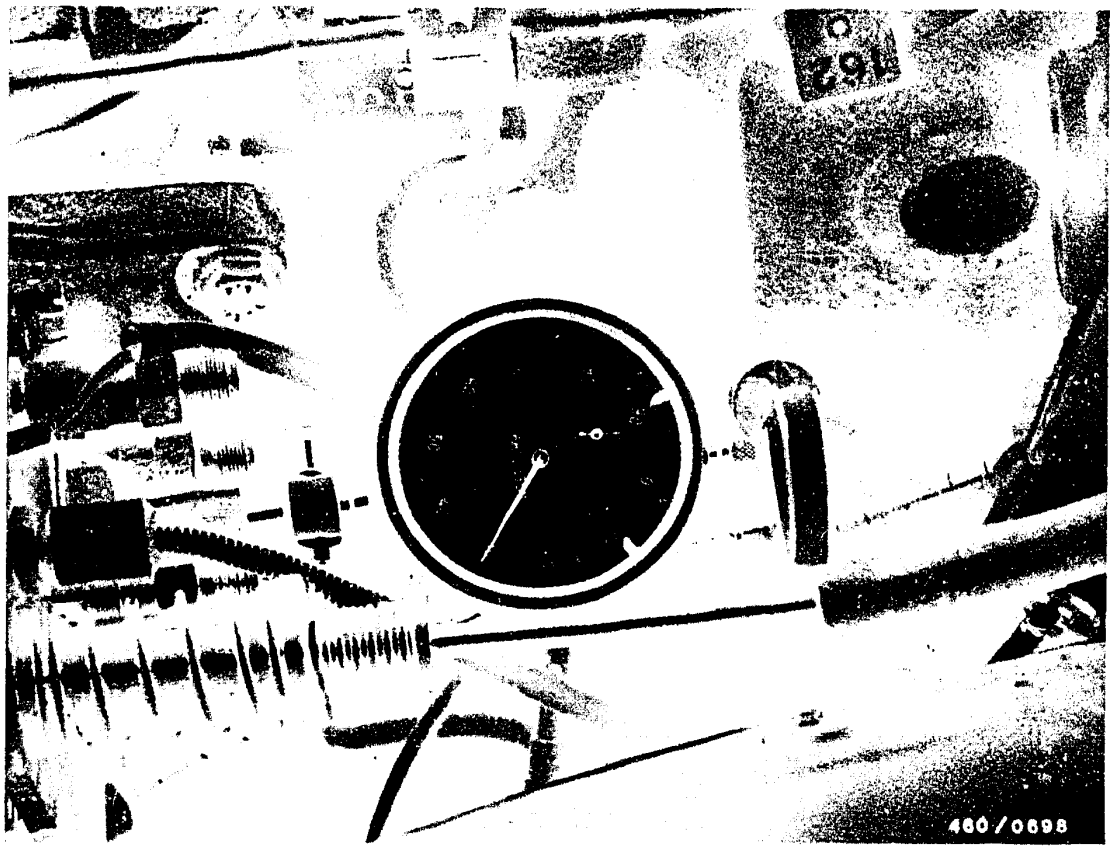
Turn crankshaft 1/8 turn against engine direction of rotation (direction of arrow).



Remove injection lines from injection pump and nozzle-holder assemblies. (Prevent delivery-valve holders from coming loose by holding with a wrench.)

Unscrew bleeder screw from central screw plug (triangular plug) of hydraulic head.

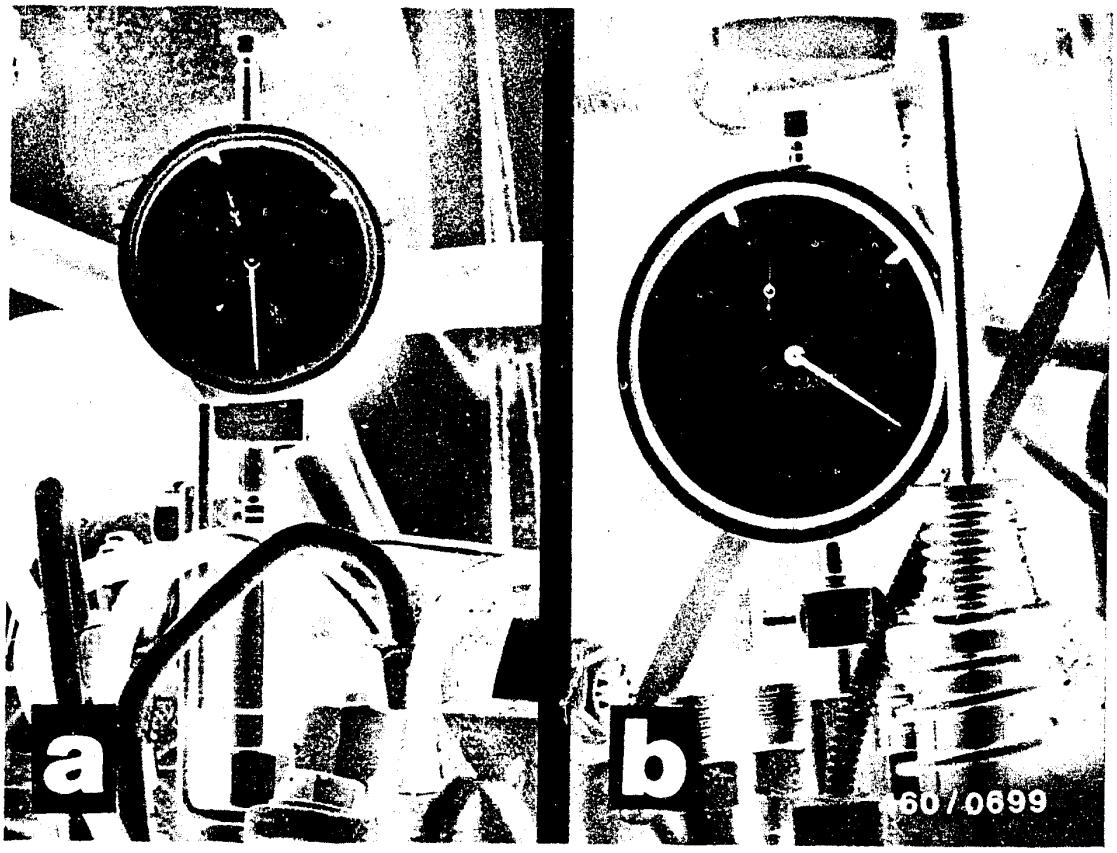
Mount measuring tool KDEP 1085 with dial indicator in tapped hole.



Preload dial indicator by approx. 2.5 mm.

Slowly turn crankshaft against engine direction of rotation until the pointer of the dial indicator no longer moves.

Set dial indicator to "0".



Set crankshaft in engine direction of rotation to the correct value for the vehicle (Fig. a).

Peugeot 309	1.9 D		
Peugeot 305	1.9 D		
Talbot Horizon	1.9 D	Cylinder 4	0.57 mm BTDC
Citroen BX	1.9 D		
Peugeot 205	1.7 D	Cylinder 4	0.80 mm BTDC
Citroen Visa	1.7 D		

At the stated piston positions the dial indicator on the injection pump must indicate a plunger stroke of 0.29... 0.31 mm ABDC (Fig. b).

If necessary, correct the plunger stroke by pivoting the injection pump.

Testing the injection timing

Turn engine crankshaft in engine direction of rotation until cylinder 4 is at TDC.

Check zero position of dial indicator on cylinder 4.

Turn crankshaft 1/4 turn against engine direction of rotation, then slowly turn back in direction of rotation until pump plunger stroke of 0.30 mm ABDC.

In this position the engine piston must be:

Peugeot 309	1.9 D	
Peugeot 305	1.9 D	
Talbot Horizon	1.9 D	0.54 ... 0.60 mm BTDC
Citroen BX	1.9 D	
Peugeot 205	1.7 D	0.77 ... 0.83 mm BTDC.
Citroen Visa	1.7 D	

If incorrect, set engine piston to 0.57 mm or 0.80 mm BTDC and set injection pump to 0.30 mm ABDC by pivoting.

Tighten injection-pump fastening screws to 25 Nm.

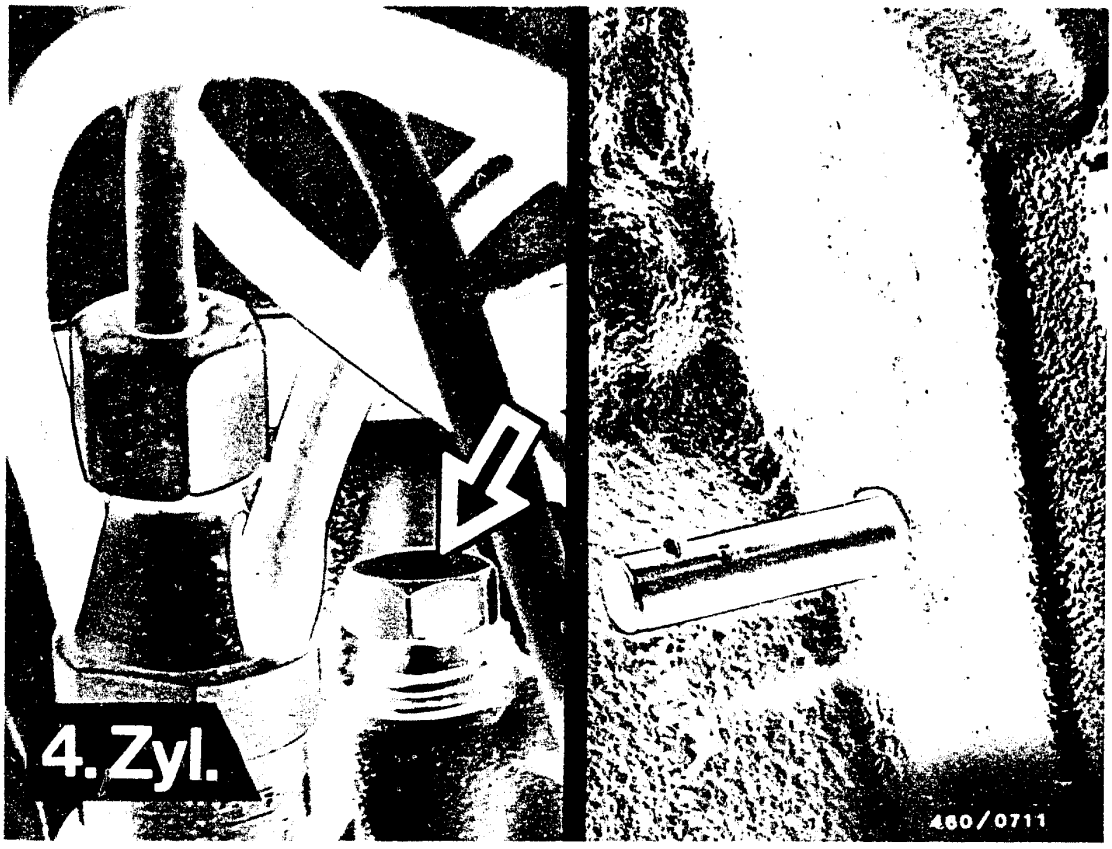
Remove measuring tools KDEP 1085 and KDEP 1143 with dial indicator and holder.

Mount bleeder screw on injection pump with new seal ring.

Screw plug into cylinder head.

Mount cylinder head cover, toothed-belt protection cover and sheathed-element glow plugs.

Tighten injection lines with open box wrench KDEP 1115, preventing the delivery-valve holders from turning by holding with a wrench.



26. Injection timing

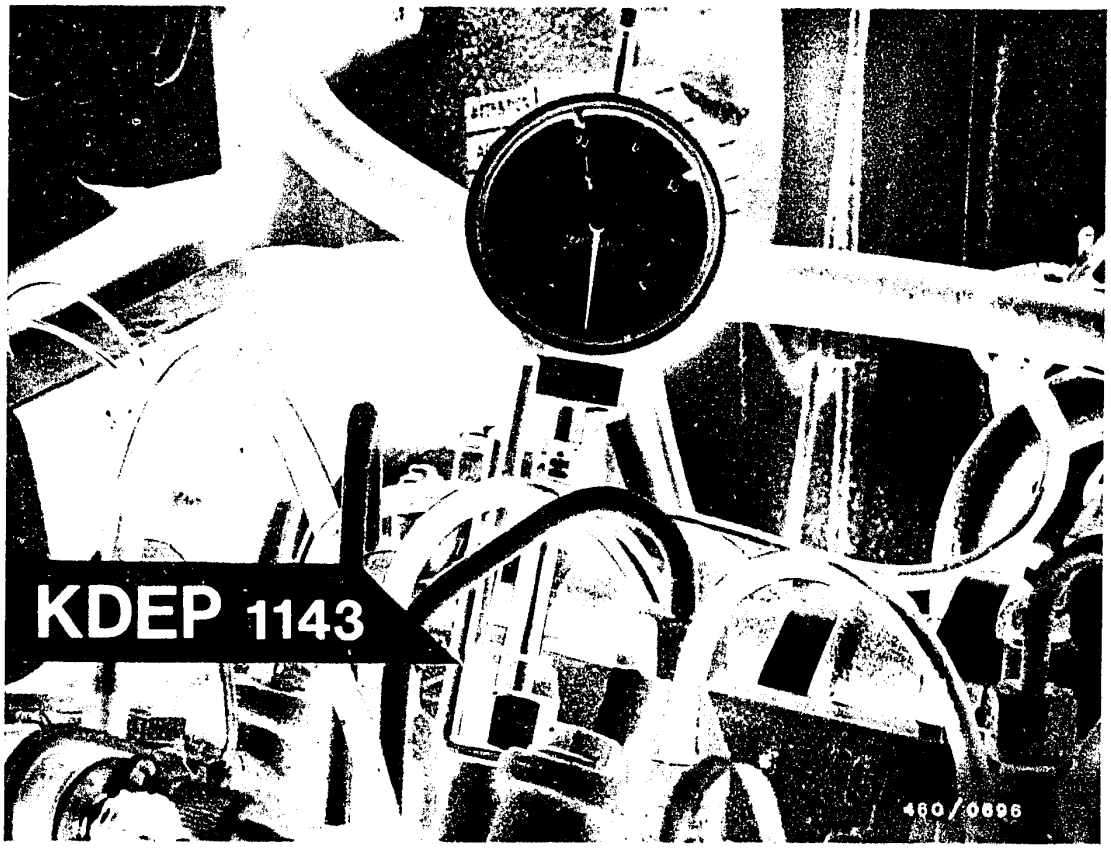
Remove cylinder-head cover.

Remove sheathed-element glow plugs.

Turn crankshaft to TDC on cylinder 4 (cylinder 1 on valve overlap).

Check engine position with setting mandrel KDEP 1145.

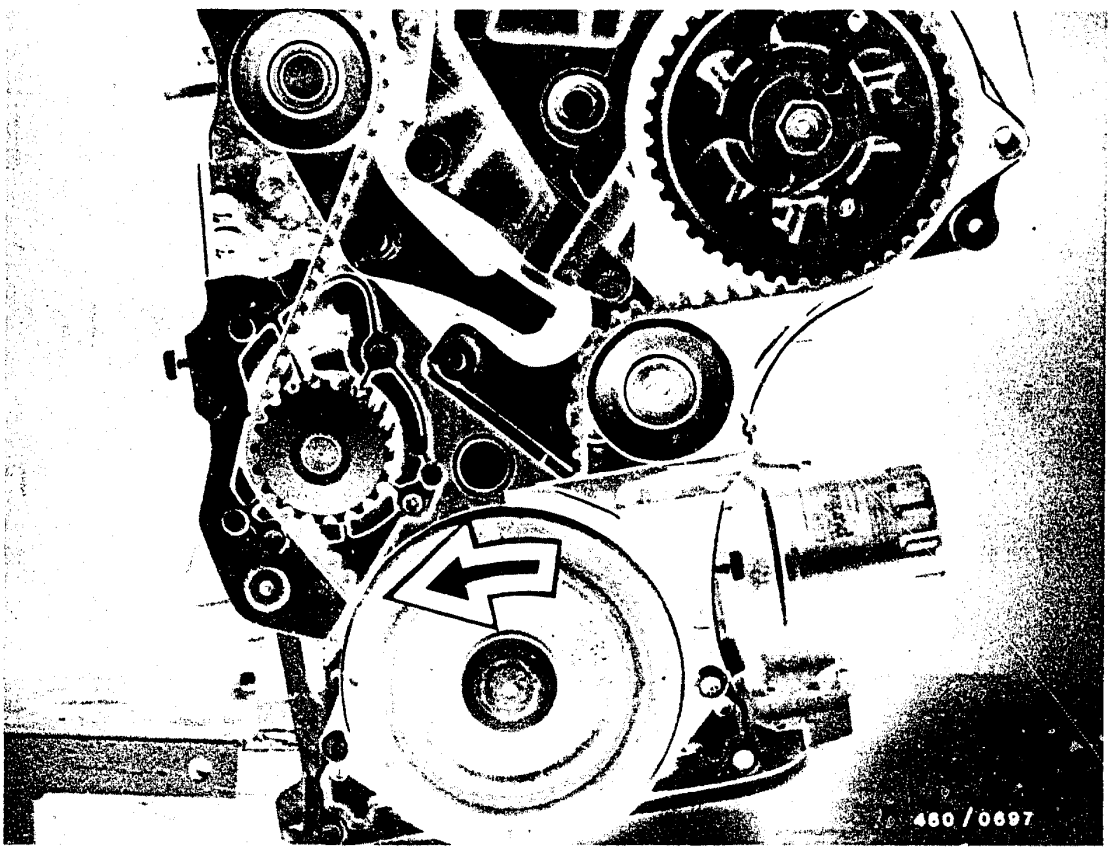
Unscrew plug on cylinder head (arrow).



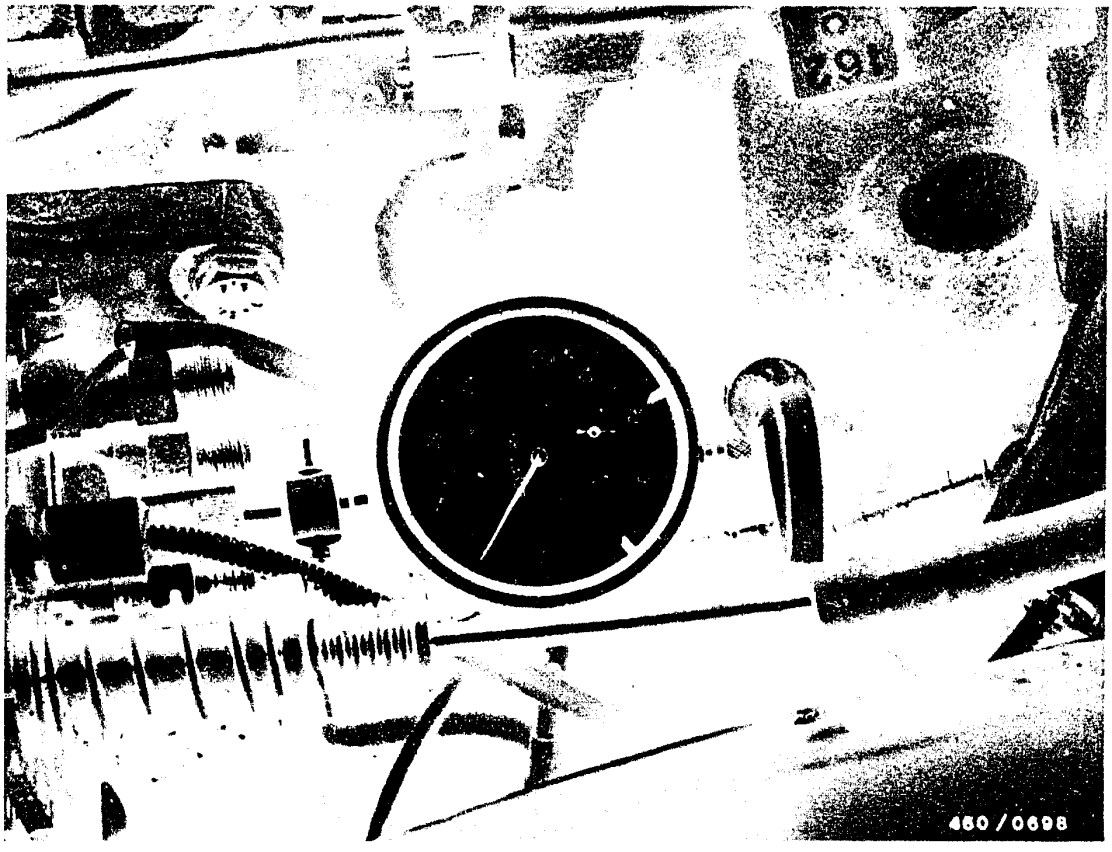
Mount measuring tool KDEP 1143 with dial indicator in tapped hole of plug.

Align dial indicator and preload.

Find TDC position of cylinder 4 and set dial indicator to "0".



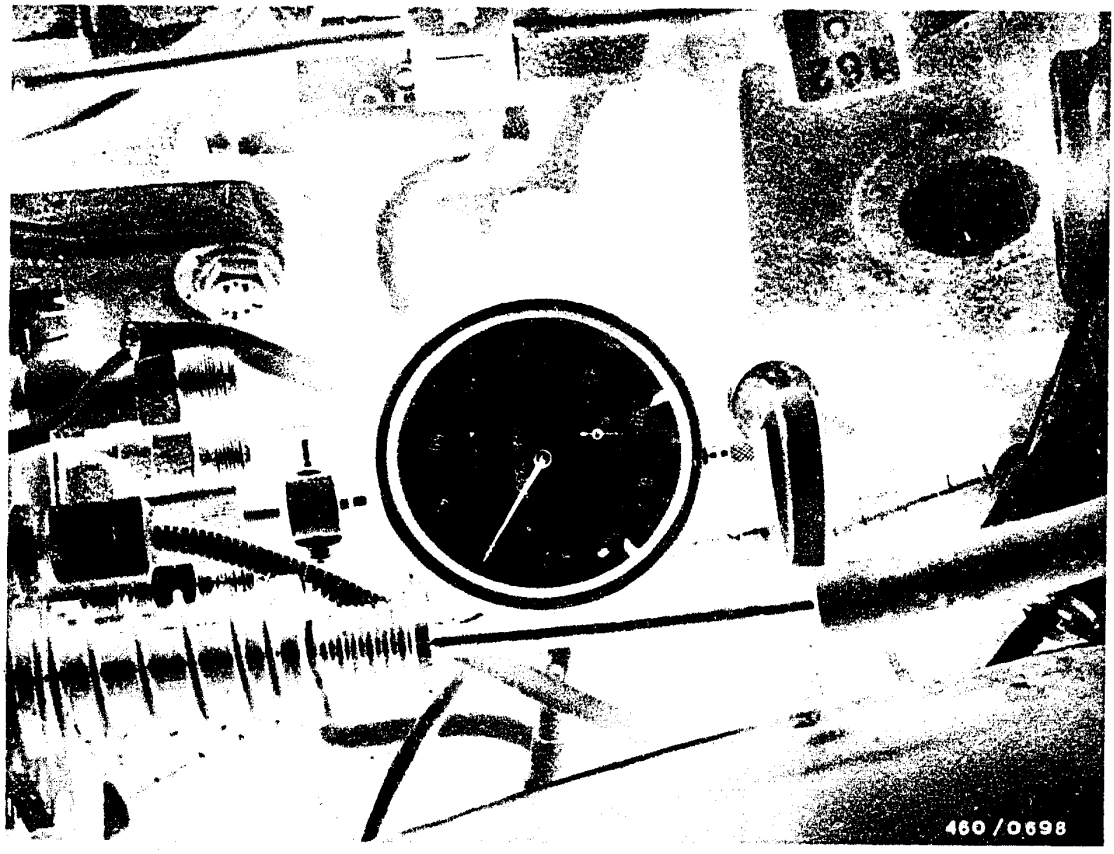
Turn crankshaft 1/8 turn against engine direction of rotation (direction of arrow).



Remove injection lines from injection pump and nozzle-holder assemblies. (Prevent delivery-valve holders from coming loose by holding with a wrench.)

Unscrew bleeder screw from central screw plug (triangular plug) of hydraulic head.

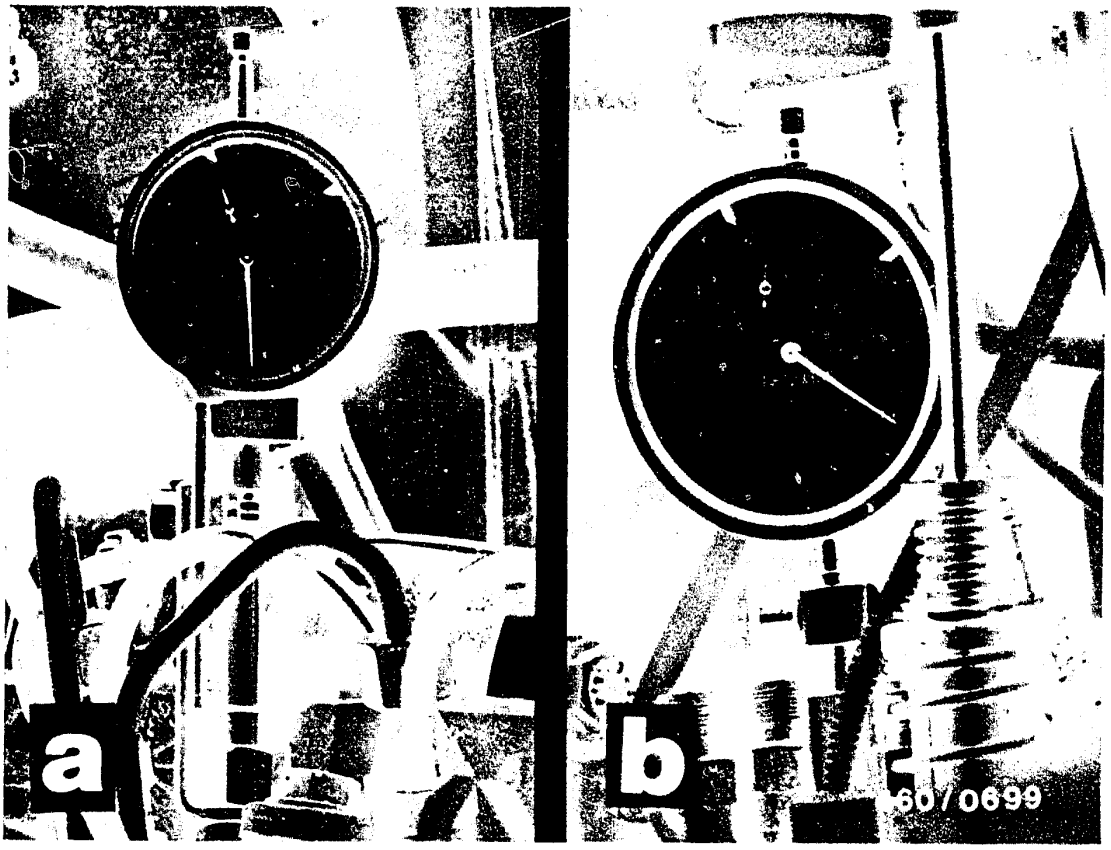
Mount measuring tool KDEP 1085 with dial indicator in tapped hole.



Preload dial indicator by approx. 2.5 mm.

Slowly turn crankshaft against engine direction of rotation until the pointer of the dial indicator no longer moves.

Set dial indicator to "0".



Set crankshaft in engine direction of rotation to the correct value for the vehicle (Fig. a).

Peugeot 309	1.9 D		
Peugeot 305	1.9 D		
Talbot Horizon	1.9 D	Cylinder 4	0.57 mm BTDC
Citroen BX	1.9 D		
Peugeot 205	1.7 D	Cylinder 4	0.80 mm BTDC
Citroen Visa	1.7 D		

At the stated piston positions the dial indicator on the injection pump must indicate a plunger stroke of 0.29... 0.31 mm ABDC (Fig. b).

If necessary, correct the plunger stroke by pivoting the injection pump.

Testing the injection timing

Turn engine crankshaft in engine direction of rotation until cylinder 4 is at TDC.

Check zero position of dial indicator on cylinder 4.

Turn crankshaft 1/4 turn against engine direction of rotation, then slowly turn back in direction of rotation until pump plunger stroke of 0.30 mm ABDC.

In this position the engine piston must be:

Peugeot 309	1.9 D	
Peugeot 305	1.9 D	
Talbot Horizon	1.9 D	0.54 ... 0.60 mm BTDC
Citroen BX	1.9 D	
Peugeot 205	1.7 D	0.77 ... 0.83 mm BTDC.
Citroen Visa	1.7 D	

If incorrect, set engine piston to 0.57 mm or 0.80 mm BTDC and set injection pump to 0.30 mm ABDC by pivoting.

Tighten injection-pump fastening screws to 25 Nm.

Remove measuring tools KDEP 1085 and KDEP 1143 with dial indicator and holder.

Mount bleeder screw on injection pump with new seal ring.

Screw plug into cylinder head.

Mount cylinder head cover, toothed-belt protection cover and sheathed-element glow plugs.

Tighten injection lines with open box wrench KDEP 1115, preventing the delivery-valve holders from turning by holding with a wrench.

TABLE OF CONTENTS

Section	Coordinates
Structure of microfiche	A 1
1. Test specifications	A 2
2. Diagram of fuel lines	A 4
3. Terminal diagram of preheating system	A 6
4. Test equipment and tools	A 8
5. Installation position of components	A 10
6. Trouble-shooting chart	B 1
Test steps	
7. Check tank vent	B 5
8. Check routing of fuel-injection tubing	B 6
9. Check overflow restriction	B 7
10. Test operation of shutoff device	B 8
11. Diagram of fuel lines	B 11
12. Bleed fuel system	B 13
13. Replace and drain water from filter box	B 15
14. Test injection system for leaks	B 18
15. Test fuel lines	B 21
16. Smoke test / Check air filter	B 22

TABLE OF CONTENTS (Continued)

Section	Coordinates
17. Adjust idle speed	C 6
18. Test injection nozzles	C 14
19. Test fuel filter	C 18
20. Test preheating system	C 21
21. Test timing device	D 16
22. Measure engine compression and compression loss	D 17
23. Remove fuel-injection pump	E 4
24. Install fuel-injection pump	E 11
25. Test and adjust engine timing	F 8
26. Injection timing	G 1

Automotive Equipment - After-Sales Service
Department for Technical Publications KH/VDT,
Postfach 50, D-7000 Stuttgart 1

Published by: After-Sales Service Department for Training and Technology (KH/VSK). Press date: 1.1987
Please direct questions and comments concerning the contents to our authorized representative in your country.